Engine
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FOOD INDUSTRIES

JUN 5 1942

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

PROGRESS... A WAR FOOD REQUIREMENTS COMMITTEE

(SEE PAGE 35)

JUNE 1942

Unit Processes Classified

Preventing and Removing Milk Deposits

Why Ruin Good Raw Material?

How To Make Cheese Spreads

Official Reviews Bottler's Problems

Prevention of Explosion Hazards

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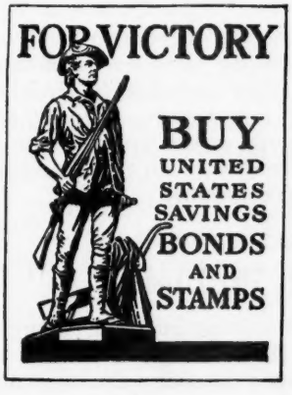

WHY

Management and workers in the food industries should make an effort to increase the purchase of U. S. Savings Bonds for this reason: If the government is compelled to go to the banks for the bulk of the funds required to finance the war, the result will be to increase inflation tendencies. This is true because when the banks buy government bonds they do not pay for them with cash, but with credit. But when bonds are purchased out of current incomes, such savings help to reduce excess consumer buying power.

The most effective single method for promoting systematic purchase of U. S. Savings Bonds is through the payroll savings plan. And the Secretary of the Treasury suggests that at least 10 percent of the gross payroll be set aside by employees for the purchase of savings bonds.

FOOD INDUSTRIES

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This Issue

Danger From Within

Since December 7, explosions have come to mean destructive visiting cards from the enemy. But your plant is much more likely to be blown up by careless or improper combustion control in your furnace or oven than by act of Hirohito or Hitler. Equipment is sometimes wrecked and employees injured when an unburned fuel-air mixture is allowed to accumulate in a furnace or oven, to be touched off subsequently when ignition, or re-ignition, of the flame takes place. Why these explosions occur and how to prevent them are told on page 58 by Theodore A. Cohen, chief engineer of Wheelco Instruments Co., Chicago.

Well, Why Do You?

"Why Do You Ruin Good Raw Material?" This article on page 63 asks poultry packers in particular, and food processors in general, a question that may or may not need an answer. But in any event, the question and what's back of it are worth considering. It is asked by a quantity buyer who has had considerable difficulty obtaining the quality of product required for her business, which quality is the same as that demanded by the alert housewife. Some faces will be red when this article is read.

That Ounce of Prevention

There are two aspects to the problem of what to do about milk deposits on equipment and utensils. One is how to remove such deposits; the other, how to prevent their formation. Obviously, if no milk deposits are allowed to form, the more costly operation of removal will be avoided. Avoided also will be the contamination, off odors and off flavors attendant upon the presence of milkstone. For a helpful discussion of this problem, see the article on page 44 by Lewis Shere.

Keeping Things Straight

Food technology and engineering are such broad fields that it is often difficult for the practitioner to "see the woods for the trees." He becomes so immersed in the details of his particular branch—baking, canning, meat packing or what have you—that it is difficult to relate what he is doing to the field as a whole and thus profit by the experiences of others.

One great aid in this helpful integration of food technology is to classify the unit processes common to two or more branches of food manufacture, so that the food technologists can readily identify them, wherever they occur. This is done tentatively by Dr. C. A. Shillinglaw on page 40.

Coming

Roll Out The Barrel!

Metal packages for foods having passed out of the picture—except for certain specially exempted products—bulk food packers are actively in the market for substitutes—bags, boxes, kegs, barrels and firkins. In particular, great interest is evident in the use of barrels—at one time the most used bulk food package.

To help those who will use barrels, but have never done so before, FOOD INDUSTRIES will publish a discussion of barrels—the kinds available and how to use and care for them—by a man who makes them.

Floors That Last

Probably no element of the buildings in which foods are processed causes as much heart-felt cussing as do the floors. On the other hand, no other element receives less constructive attention.

Consequently, FOOD INDUSTRIES is pleased to announce the forthcoming publication of another article on food plant floors by Richard Kanegsberg, a recognized expert on floor construction and materials. His article treats briefly of the various types of floor construction suitable for food plants.

How Old is a Kernel?

As all food men know, the desired quality in processed vegetables is attained only when the products are harvested at the optimum stage of maturity. But to determine when that stage is reached requires precise know-how and precision methods. The technic for sweet corn has just been studied in a large corn canning plant by technologists of American Can Co., and their comparative study of the methods for determining sweet corn maturity will be published in July. The study shows that precision instruments speed the quality-control technic. The facts have wide significance in the food industries.

Help on a Hot Problem

How should dehydrated foods be packaged? Many in the food industry are seeking the answer. The problem is complicated by two factors, one involving the technology of protective packaging, and the other the little matter of finding suitable substitutes for the tin can, the "perfect" container for dehydrated foods. Help on these problems will be given in the July issue. There will be an article based on the paper presented at the Packaging Conference by L. K. Harper, vice-president of Sardik Food Products Corp. Also, there will be illustrated and described packages being used by commercial dehydraters.

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FOOD INDUSTRIES
FOR THOSE WHO CONTROL QUALITY
THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor JUNE, 1942

War Food Requirements Committee

ANNOUNCEMENT at the AGMA convention of the formation of the War Food Requirements Committee, which is to be headed by Secretary of Agriculture Claude R. Wickard, marks the initial step in coping with the problem of food supply of the United States and the United Nations. Its place within the organization of the War Production Board assures comprehensive treatment of war food problems as a whole, for had it been set up independent of the WPB, the WFRC would still face the jurisdictional and priority problems that have heretofore existed. All who have been concerned about the problem are much relieved that this step has been taken.

Even though, at the moment, the formation of the WFRC and the naming of Secretary Wickard as Food Coordinator brings about no more than a plan for planning, at last something constructive has been started. And it has been started in the right direction. If this committee functions promptly and aggressively there is still time in which to assure that the military problems of the United Nations shall be decided solely by our ability to fight and not suffer reverses or defeat by lack of food. It must never be forgotten that, like our Army in Bataan, which gave out chiefly for lack of food, both the civil population and the armed forces of the United Nations must be adequately fed or they, too, may succumb—not to the force of arms, but to the weaknesses caused by short rations.

Ahead of the WFRC lie many huge problems and many decisions that must be made in the sweat of agony. Long-range foresight must be theirs. Such unexpected contingencies as drought and crop failures must be reckoned with. Such disasters as greatly increased sinkings of food cargoes must be included in their calculations. And even such decisions as fewer tanks in favor of more boilers and fans for dehydration plants, or one or two fewer battleships in favor of more food processing equipment, or fewer new armament plants in favor of more metal closures or containers, ammonia compressors or freezer storage warehouses must be made promptly and accurately. For nature and crops wait on no man, and a few weeks' delay now may be the indirect cause of military disasters a year or two hence.

Of the many functions the WFRC must perform, there are a few that deserve emphasis at the outset. Industrialists who constitute the principal personnel of the WPB as a rule are not seasonal-crop minded. In the inevitable competition for metals, machinery and equipment, it is but natural to expect the WPB industrialist to side unconsciously with the insistent demands of the Army and Navy. Already these demands have converted many food equipment builders to munitions work to such an extent that certain forms of equipment will be well-nigh impossible to obtain when needed. Even the loss of a week at planting or harvest time may represent a 25 percent loss of a crop. Apparently one of the greatest problems ahead is to decide how much food is needed, and when. Then all the necessary preparations must be made and all the necessary priorities granted in order to obtain it.

Farm labor must be provided somehow as well as drafted men to create a huge army. Packaging supplies must be made available somehow, or perishable foods cannot be preserved in the amounts needed for our Allies and ourselves. An expansion of the locker freezer plant must be encouraged and facilitated where it is economically sound. If steel shortages compel a reduction of use of metal containers or closures, the adoption of alternate methods of food preservation for civilians and Lease-Lend must be encouraged and facilitated. Furthermore, the WFRC would do well to develop a technical advisory and service staff to guide food manufacturers through the initial period of using unfamiliar methods. Above all the WFRC must treat food as food, not as the end products of a series of unrelated processing industries.

Decisions bearing on these matters will bring the food

needs of the United Nations into headlong conflict with production requirements for their own military needs. The job of the WFRC will be tough and thankless. It will call for the highest character of the individual, and toughest moral fiber, and the greatest breadth of view. It will be no place for selfishness, nor partisanship. The function of WFRC is not to gain a preferred position for agriculture, not to grant to the food industry a business-as-usual treatment, not to inflict on the body politic some pet theory, be it economic or nutritional. The sole function of the WFRC is to help win the war!

L V Burton EDITOR

The Talk of the Industry

● THOSE who have not forgotten their economic geography of the world will understand the shortage of tankers that necessitates gasoline rationing. After the loss of the Borneo, Java and Burma oil fields the nearest oil supplies to Sydney, Australia, are those of California. The next nearest are those on the Persian Gulf. A tanker can make only three rounds a year on such runs that are roughly 8,000 miles each way.

● POPPY SEEDS, much used by bakers and for oil pressing, may become a matter of controversy between the Department of Agriculture and the Federal Bureau of Narcotics. With annual imports running into millions of pounds now cut off by war, the Department of Agriculture sees an opportunity for domestic agriculture in cultivating the blue poppy. But the poppy has, alas, a rather evil reputation in the Orient and the Bureau of Narcotics regards the whole idea with something less than repressed enthusiasm.

● LICENSES approved by the Chief Health Officer are required for the peddling of food, soda water, other aerated water or ice cream in the Pan-

ama Canal Zone. From which one deduces that suspicious persons are very unsanitary.

Food Plant Conversion

Rush Watkins is Chief, Food Conversion Section, War Production Board, Washington, D. C. Food manufacturers who need advice on conversion problems may consult his office. This applies only to food manufacturers, not to equipment manufacturers.

Play Fair With Equipment Makers

In spite of all the publicity that has been given to the matter of priorities (see FOOD INDUSTRIES, January, 1942, page 39), some food processors of essential civilian foods are still unaware of the steps necessary to procure new equipment or maintenance supplies. Orders without priorities are still being received by equipment makers. And many seem to know nothing of the Production Requirements Plan, by means of which all manufacturers of essential civilian foods should procure their maintenance, repair and operating supplies, as well as production materials.

The fact of the matter is that no equipment maker or supplier is in a position to fill the food manufacturer's orders unless that food manufacturer first secures a preference rating. The equipment maker or supplier cannot secure this rating for your order. You must do it yourself. And it is unfair to him to give him orders, without preference ratings, which he cannot fill. He naturally wants to serve you, but cannot do so unless you do your part first.

Some food manufacturers, unfortunately, take the stand that there is no use applying for a preference rating unless they are processing food for the Army, Navy or Lease-Lend. Of course, that is not so. Food for the civilian population of the country is still considered essential. Necessary maintenance and repair supplies, and even new equipment, are receiving adequate priorities.

So the wise food manufacturer applies for the preference ratings needed to process essential foods for civilian use. Then, when he orders this material, he has a rating ready to extend to his supplier. Only in this way can he get what he needs, so that food production can be maintained at an adequate level.

● CARBONATED beverage and hot dog sales to roadside stands, to say nothing of tourist houses and camps, will ap-

parently be the first to feel the pinch of the new restrictions on auto travel. Food firms that have built up a nice business in this specialized market will find that most of the customers can no longer get there.

Maximum Price Regulation

"To know all is to forgive all" is an old saying, hoary with age. But to know that the Agricultural Adjustment Act calls for 110 percent of parity prices, that the Wagner Act calls for collective bargaining, or that the best economic brains realize the urgent need for action to prevent a rapid increase in prices, commonly called inflation, cannot make one believe that the Emergency Price Control Act of 1942 is realistic. It is unrealistic because it attempts to control retail prices of many items including "cost of living commodities" without also controlling wages and farm prices. And because of these omissions, the troubles ahead appear

ominous. But you can't blame Leon Henderson for carrying out the instructions from Congress; that's his job.

Congress itself is to blame for writing a law that has vital omissions. And, alas, Congress is but a reflection of our own collective and individual selfishness.

How the new regulations will work out, and what it will mean to the food manufacturer will, we believe, depend on the soundness of the manufacturer's past business policies and his choice of retail outlets, especially as of the base period, March, 1942.

Price cutters are stuck. Loss leaders must continue unless officially relieved or the item is discontinued. All special discounts, allowances and services must be kept. One hears a lot about "rolling back" the margin squeeze on to the manufacturer. Which means that OPA expects a vociferous demand on the manufacturer for lower prices to permit the distributors "to live." To permit the manufacturer "to live," in case he is badly pressed, the hope is to give him subsidies from the Federal Treasury. But price ceilings may not be punctured, or as OPA Bulletin No. 1, issued April 28, 1942, puts it on page 28: "One thing should be clearly understood. Retail prices will not be increased." (Better get a copy from OPA and study it.)

It is suspected that manufacturers will study their customers and weed out the bad actors, and the inefficient ones, and concentrate on those whose March margins are high enough to keep them going.

An unexpected result of price control is likely to be the development of Federal standards of quality for everything. Chiseling by cutting quality will be prohibited. The Federal Civil Service Commission is already looking for qualified persons to form a corps of quality inspectors.

Food Technologists Convene June 15-17

Every person in the food industry who is facing technical and scarcity problems should plan to go to the convention of the Institute of Food Technologists, Nicollet Hotel, Minneapolis, June 15 to 17. The completed program, published in full in this issue, is devoted entirely to wartime problems, such as substitutes for scarce materials used as ingredients; food packaging problems under today's scarcity conditions; dehydration of foods; foods for the Army; prevention of food stockpile deterioration.

Those who are not members of the Institute will be admitted on payment of a modest registration fee.

Embarrassing Paper Situation

Waste-paper salvage has temporarily become an embarrassment, so rapidly has the industrial picture changed during the current period of plant conversion. Not many months ago the demand for paper containers exceeded the supply of raw materials—hence the strenuous waste-paper salvage campaign, which is now in full swing. Then came the plant-conversion order. Whole industries were shut down, and seemingly those which were closed were some of the biggest users of corrugated board: radios, refrigerators, bicycles, innerspring mattresses, electrical appliances—to mention but a few. And on top of that the WPB stopped the manufacture of canned spaghetti, pork and beans, soups, and so forth, all of them big users of corrugated containers.

With the closing of such industries, the demand for huge quantities of paper packing materials abruptly ceased. Corrugated-box makers are actively seeking new business to keep them going until plant conversions are completed and the war demands will again keep them busy. Meanwhile they dare not stop buying waste paper, though they scarcely know where to store it.

Moral: Buy your boxes now while you can.

Liners for Closures Still Sought

Substitutes for cork liners for crown closures for beverages are still the subject of active research, but success has not yet been won.

Barks, piths and roots of a fibrous nature, though satisfactory for heat insulation when composited with a suitable adhesive, have practically no resiliency when used to replace cork for sealing highly carbonated liquids. Cork possesses resiliency in all direc-

Hors d'Oeuvres

• Every time a 16-in. gun fires it eats up the distilled product of a fifth of an acre of sugar cane. Let's plant a million acres for Tokyo.

• *Look to liver to liven you up, say the packers. We used to take pills for the liver. Now we just take liver.*

• There need never be a food shortage, says Dr. George Washington Carver, as long as Nature provides weeds and wild vegetables. And to prove his point he comes up with recipes for sour grass pie, a wild rhubard and pig-weed dish and pickled poke salate. We hope we never have occasion to doubt his word.

• *The latest stunt in merchandising is the Victory Sundae, sold in combination with a 10-cent Defense Savings Stamp. Which reminds us: 'Tis better to buy Defense Bonds than let the Nips take your chips.*

• Salt is as effective as fine sand in smothering fire bombs. So you should take air raid threats with somewhat more than a grain of salt.

• *The Interior Department suggests that the family meat bill can be reduced by raising rabbits in the back yard. But rabbits have such habits.*

• Sulfaguanidine has been found effective in the treatment of cecal coccidiosis. If you understand that, you ought not to be reading this column. If you don't it's simply that one of the new sulfa drugs will cure one of the most troublesome of poultry diseases.

• *Russians give fish its rightful place in the menu—a very important place. And here's hoping they soon serve up that well-known fishface of variety Adolf.*

• Americans in 1941 consumed more than 120,000,000 lb. of tenderized beef. And at a time when we should have been eating raw meat.

• *Winner in the Pan-American Coffee Bureau's song contest was "Coffee for Three." But "Brew for Two" would be so much more homey.*

• National Sugar Refining Co., which sells in normal times about 600,000 tons of sugar a year, had to get a sugar rationing card for its employee cafeteria. And there was no complaint.

• *A microbe discovered in stale beer is reported to be capable of killing many of the germs that attack "homo sapiens." So if you're feeling badly, let your beer stand until it tastes like you feel.*

F.K.L.

tions, whereas fibrous material is seldom resilient in more than one direction. Elastomers, either natural or synthetic, including rubber and rubber-like material, may be used in disks, rings or facings for cushion disks of cardboard for sealing the gaseous pressure of carbonated beverages without leakage. BUT the elastomers are restricted by WPB to more important war uses. So they, too, are out.

Paper and plain pulp materials fail to possess the requisite resiliency or elasticity for carbonated-beverage closures, although treatment with certain materials now too scarce to be used for this purpose will make them more resilient. The best of untreated pulp materials has an initial resiliency or elasticity of only one-third that possessed by cork, yet the sealing efficiency can be markedly increased by the use of the prohibited elastic facing materials.

Closures for food uses other than pressure goods offer fewer problems. Hence substitutes for cork liners for articles like jams, jellies, pickles, mayonnaise and mustard are available to some of the closure manufacturers. And many of these liners that cannot seal internal pressures are capable of sealing vacuums.

Reseach for the ideal substitute for cork and rubber in liners continues in many places, but even though pressure goods seem now to present a discouraging problem, there is considerable optimism about the future for nonpressure or vacuum closures.

A Common Error

Professor Leake has taken us to task over something that was published in another periodical with offices located at the same street address. His letter is published on page 102 of this issue. It affords us an excellent opportunity to point out a common error of confusion of identity. FOOD INDUSTRIES has no connection whatsoever with the publication named in his letter.

No Rejoinder

The criticism of the Food & Drug Administration's attitude toward monochloracetic acid, contained in Professor Leake's letter on page 102, was submitted to that organization prior to publication. F&DA, given the opportunity, courteously declined to supply a rejoinder.

24 Questions to Answer In Your Pilot Plant

Pilot plants have been all too rare in the food processing industry. But in 1942 there should be a goodly number in operation on dehydration of vegetables. The current success of Dry Pack Corp. has a sound basis on two years of pilot plant experience. (See FOOD INDUSTRIES, September, 1941, page 53.) Others who want to build an enduring commercial success must utilize the remainder of this year to gain small-scale experience before taking the big plunge in 1943.

The purpose of a pilot plant is to learn the engineering problems that must be solved when a new method of processing is taken out of the laboratory and put into operation. Most such problems can be identified and their solutions developed from small-scale production. There is no need to go to full-scale production to learn all the headaches and disasters that may arise.

There Should Be a Plan

Good pilot-plant operation is a research department function, and every move and every step should be planned with the same care that is used in a scientific research. A good rule is: Decide what you want to find out before going into commercial operation—then find it out. There will, of course, be plenty of unforseen discoveries. Yet any food technologist will agree that it is highly desirable to know many things such as: (1) What varieties to use. (2) What maturity for harvesting. (3) Effect of prompt and delayed handling. (4) Optimum temperature of holding between harvest and processing. (5) How long each raw material may be held before processing without noticeable deterioration of quality of the finished goods *after about eight months' storage*. (6) Best methods of inspection, preparation, slicing or cubing (some products will be new to you). (7) Best method of blanching. (8) What the temperature should be if a water blanch is used; what the best ratio is of volume of water to volume of raw material passed through. (9) Whether it would be desirable to fortify the blanch water with vitamin C to prevent leaching it out of vegetables, and what about pH. (10) How long blanched raw material can be held before actual dehydration. (11) What "surge" points must be established and how large must they be to avoid line shutdowns due to mishaps or subsequent delays. (12) Whether provision should be made for reblanch after any delays.

Still More Problems

Then there are other questions to be answered, such as: (13) How many pounds of steam or fuel are needed to evaporate the water from a ton of raw material? (14) What steam or heat economies need to be made (fuel will be very hard to get in 1943)? (15) What rate of air motion is used, and what is the optimum rate for each variety under a host of variable conditions? (16) What is the best relative humidity at various stages of the process, the best temperature, the proper length of time? (17) What sequence of variations of time, relative humidity, temperature and rate of air flow gives best results? (18) What instrumentation is needed for good quality control: indicating instruments, recording instruments, automatic control instruments or cycle control instruments? (19) If a tray-type dryer is used, does the product stick to the trays, how much does it cost to scrape it off, what percentage of "fines" or powder is thus unintentionally produced and is it good for any commercial use? (20) What storage facilities are needed: size, volume and temperature, insect and rodent proofing, ventilation or inert gas? (21) Must packaging be done immediately or may temporary bulk storage be utilized?

Very important calculations should be made from the foregoing data. You will also want to know: (22) How big a load this will be on your boilers. Whether you need more boilers and whether you can get them. (23) What effect outdoor humidity or dryness will have on your rate and quality of operations. (24) How many such trucks will be needed for full-scale operations, and where you are going to keep them—they take room. You can think of a lot more problems that fit your own business.

Lastly, when planning your pilot plant be sure to give yourself plenty of elbow room. Don't stick it in a corner where it cannot be altered or enlarged without tearing down the place. Your pilot plant is a place in which to derive experience. If you hamper its effectiveness you may curtail the usefulness of the experiments.

Canned meat products and canned milk are outstanding among the American foods which have become popular in England.

AMERICAN CANNED FOODS MAKE HIT IN ENGLAND

By ERIC HARDY Liverpool, England

Foods shipped through Lease-Lend find ready market in Britain's system of "points" rationing. With several American brands now being purchased in preference to English products, there is opportunity for American food manufacturers to create a new post-war market

THE Lease-Lend agreement may well prove the biggest advertisement the American food industry has ever had on the British market. When the British government released its stock of American foodstuffs with the start of the "points" system of rationing—so many "points" worth of canned food could be bought each week—the British housewife discovered that the American food industry is far ahead of English food manufacturers in ideas, novelties and methods of processing. Our food industry lacks new ideas, initiative and variety in products offered at the ordinary consumer's price. There is too little variety in British canned foods, which consist mainly of carrots, beans, peas, soups and fruit.

The new American packs have made such a hit with the British purchaser that they are preferred to the British packs, and considerable business could be done by the American food industry in Britain with these same goods after the war. Outside of the cereal food industry and the canned corned beef and fruit industries, the American food industry has never competed greatly on the English market. When Americans introduced canned tomatoes to the British public after the last war, these proved very popular, but the Americans failed to follow up their opening, and the goods disappeared from the Liverpool stores, when the doughboys went home on transports.

Canned Meat and Milk Popular

Canned goods that have been most successful on the British market have been pork luncheon meat and canned milk. One of the most successful of the former has been "Prem," and of the latter, "Pet." The processing of these foods is different and more appetizing, and the tins often contain useful recipes or hints on their labels that relieve the monotony of the English food manufacturer's methods.

My wife and I have found "Prem" pork luncheon meat better than any pack made in this country before the war. Hundreds of other homes are talking about these new American "points" meats. Mouths have been made to water by the suggestion on the label to serve it covered with sugar and honey. We have had it fried instead of bacon for breakfast, cold for lunch, or as excellent sandwiches. "Spam" and "Mor" have proved equally popular meat packs. So has your tinned pork tongue. But for some reason the pork sausage meat did not sell nearly as well as "Prem," and the government reduced the number of "points" coupons required to purchase it in order to avoid a surplus stock in the hands of storekeepers. I think this was because the large tins were offered at 2 shillings 6 pence (60 cents, at par) a tin, which is too much for the average housewife to spend at one time. Smaller tins at a smaller cost might have sold better. The English working-class wife, who is the biggest purchasing factor in the cooked-food trade, buys her food in small tins according to her daily needs. She rarely buys a week's supply at a time. The bulk of Englishmen receive their wages weekly, not monthly, so that housekeeping money is spent in frequent small amounts. Only the rich have monthly accounts, booked by telephone.

Pork luncheon sausage was also supplied in too large packs, such as 6-lb. tins. The shopkeepers opened these tins and sold the meat in small lots, but probably due to the limitation of purchase under "points" rationing, it was difficult for them to sell out the

(Turn to page 106)

PROPOSED CLASSIFICATION OF THE UNIT PROCESSES

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Systematic approach to the problems of food technology and engineering requires the grouping of the various steps in food manufacture into unit operations and processes. Here is a first attempt at classifying the unit processes. A similar first treatment of the unit operations will be found in *Food Industries*, February, 1936, page 77. Discussion of these proposed unit processes is invited.

FOR some time past there has existed in the chemical process industries a rather fruitful concept in which the manufacture of each of various products is considered, not as a separate entity, but rather as made up of a series of steps. These individual steps are common to the manufacture of many things, and the details of and principles governing each step are studied separately. Operations that are primarily physical in nature, such as filtration, distillation, drying and crushing, have been called "unit operations." Those primarily of a chemical nature, such as nitration, sulphonation, esterification and oxidation, have been called "unit processes."

Unit Operations Classified

The unit operations of food manufacture have already been tentatively classified by Burton[1], and it seems to the writer that a similar classification of the unit processes pertinent to this industry might be useful in several ways. In the first place it would allow a simplified and organized study of such things about each process as those pointed out by Shreve[2] for the unit processes of the chemical industry. These things include, among others: Factors affecting the reaction or process, byproducts or side reactions, suitable raw materials, mechanism of process or reaction and suitable equipment.

Such a classification would also facilitate unit-process cost accounting which, when used in combination with unit-operation cost accounting, has been found to illuminate so much more clearly than does the job method the points where manufacturing economies can be effected. But even more useful than any of these might be the mere concept that the creation of a fine food entails no secret magic, but rather a series of understandable steps, most of which lend themselves readily to scientific study, consideration and control.

This latter concept seems particularly important in view of the fact that, with the advent of commercially prepared, trademarked foods, new possibilities for the development and popularization of original food creations appeared. The bulk of the present food products have been formulated in the kitchen of either housewife or chef, popularized by long usage, and diffused among the populace chiefly through personal exchange of recipes. One need but look at the distinctive dietary items prevalent in different parts of the country for proof of this—and the commercial producer has only duplicated what the housewife created. In the intelligent creation and treatment of new and original food products, however, it is imperative for the food technologist to recognize the individual steps or processes by which foodstuffs are elaborated.

What Are Unit Processes?

It is felt that the concept of the unit processes of the chemical process industry, being only those steps by which chemical changes are produced, cannot be carried over *in toto* to the food industry for the following reasons: The important things about a chemical compound are its chemical properties or chemical behavior. The steps by which a compound of the desired chemical properties—solubility, acidity, oxidation potential and so on—is produced or developed are, therefore, the logical steps to be classified as unit processes. On the contrary, aside from the problem of food value, the important thing about a food product is the psychological sensation it imparts to the consumer at the time of consumption. This sensation is dependent on two things—flavor and texture. The present paper has as a goal, then, not merely the classification of those steps in food manufacture primarily chemical in nature, but rather a general, yet complete, classification of those steps by which the ultimate flavors and textures of the common food materials are developed and maintained.

A classification made on this basis must necessarily lead to some overlap-

Proposed Classification Of the Unit Processes

I. Hydrolysis [by (1) enzymes and (2) acids and bases].
  A. Proteolysis (proteins)
  B. Lipolysis (fats)
  C. Glycolysis and others (starch, carbohydrate and similar materials)
II. Fermentation
  A. Yeast
  B. Bacterial
  C. Mold
III. Aging or ripening
IV. Leavening
  A. Biological
  B. Chemical
  C. Physical.
V. Shortening
VI. Gel formation
  A. Carbohydrate gels
  B. Pectin gels
  C. Protein gels, (a) gelatine, (b) egg
VII. Coagulation
  A. Enzyme
  B. Chemical
  C. Heat
VIII. Extraction
IX. Cooking
X. Crystallization
XI. Flavoring
XII. Emulsification
XIII. Preservation
  A. Microbial control
  B. Enzyme control

ping between unit processes and unit operations, but the author sees no reason why certain items may not properly be considered in both categories. For example, the fact that emulsification produces changes primarily physical in nature would, under ordinary circumstances, place it logically in the class of unit operations, and the mechanics and physics of the operation should admittedly be studied from that point of view. However, the effect of emulsification on the flavor and texture of foods, the type of food ingredients which can be emulsified, and the suitable emulsifying agents should be studied from a different point of view, the point of view of food elaboration, and it is proposed to include all steps studied in this light in the category of unit processes.

I have sought to make the classification complete (see accompanying list), but the complexity of the task would make it seem unlikely that I would succeed in doing so, at least in a first attempt. It is expected and hoped that other readers will think of additional items and will be able to suggest improvements, but if it stimulates interest and thought on this approach to the consideration of food preparation, the present paper will have served its purpose.

Hydrolysis

The hydrolyses have been divided into proteolysis and lipolysis, and for brevity the remainder are grouped together under glycolysis and similar reactions, even though it is recognized that the term is not strictly correct for all of the hydrolyses grouped under this head. Examples of proteolysis are the proposed use of such proteolytic enzymes as papain for tenderizing meats and especially the action of proteinases from rennet, milk and molds in making various cheeses.

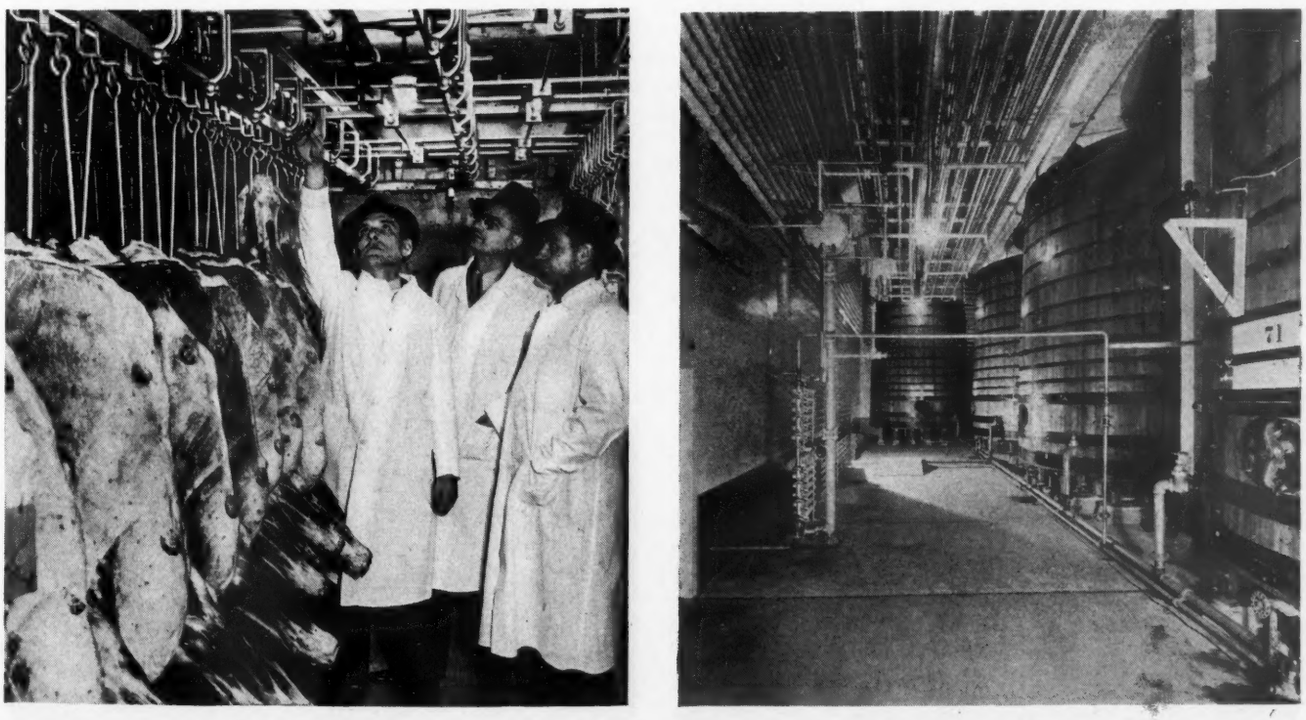
Perhaps the outstanding example of a beneficial lipolysis is the liberation of the low fatty acids, particularly caproic, caprylic and capric, which subsequently give rise to methyl ketones, by mold enzymes in developing the characteristic flavor of Roquefort cheese.

For enzymatic glycolysis and similar hydrolyses, malt diastase, naturally formed in sprouted grain, and the enzymes produced by growing mold on brain, are both used for converting starch to sugar. Bacterial enzymes are employed for hydrolyzing or peptizing starch in beer, fruit juices and chocolate sirup, and emulsion of almond kernels is utilized to hydrolyze the glucoside amygdalin of the kernel to benzaldehyde and other products, the former being responsible for the flavor and odor of bitter almond oil. Examples of hydrolyses brought about by chemical means are the acid conversion of starchy materials to sugars, sodium hydroxide treatment of olives to remove the bitterness by hydrolyzing the bitter glucosides, and acid inversion of sucrose by incorporation of fruit acids in chocolate creams to make a soft center after casting and dipping. The enzyme invertase, however, is more generally incorporated for this latter purpose.

Fermentation

Fermentations of food materials always result in two types of products—the primary product of the enzyme action, usually formed in rather large quantities, and the secondary end products of the fermentation, usually found in small quantities but responsible for characteristic and distinctive flavors. Thus, in the yeast fermentation of alcoholic beverages, the primary product is ethyl alcohol but the formation of esters and the formation of various higher alcohols by the deamination of amino acids play a great part in flavor development. In the yeast leavening of bread, the primary product in CO_2 but the formation of diacetyl beneficially influences flavor, and the fermentation processes also seem to peptize the gluten.

Important bacterial fermentations are the formation of lactic acid from sugars in the production of cheeses, pickles, sauerkraut, and cream for butter. In the latter, the formation of acetyl-methyl-carbinol and its subsequent oxidation to diacetyl is of primary importance for flavor. The bacterial production of propionic acid, with subsequent neutralization to calcium propionate, is responsible for the sweetish flavor of Swiss cheese. Bacterial fermentation is also responsible for both the leavening and flavor of salt rising bread, and for the production of vine-



Aging is a unit process common to various food industries. Here it is shown as applied to beef (left) and to wine (right). Note the contrast in equipment.

gar from yeast-fermented sugary materials, such as fruit juices, and from dilute ethyl alcohol.

Mold fermentations are used for the production of soy sauce from soy beans, for the saccharification of rice in the production of the Japanese drink saké, and for proteolysis and lipolysis in such cheeses as Roquefort and Camembert, the flavor of the latter being chiefly due to the degradation products of proteins.

Aging

Aging or ripening of food products is practiced for the purpose of allowing certain desirable, more or less natural, changes to take place. One type of product often allowed to undergo such changes is meat, in which the lipolytic and proteolytic enzymes naturally present in the tissue degrade the fats and proteins, bringing about an increased tenderness and change in flavor. Another is fermented beverages, in which the formation of esters, which improve the aroma and bouquet of the beverages, proceeds with time. Oxidation of tannins and higher alcohols by oxygen from the air is also a desirable effect of aging of these latter products. Artificial aging or quick aging is merely for the purpose of hastening these desirable oxidations and esterifications.

Leavening

Leavening is due to the production of gas in a batter or dough (essentially a starch-gluten-water mixture) to give it a porous structure. In bread, it is effected biologically by the gas from yeast or bacterial fermentation, as previously mentioned. Chemical leavening agents are the gas generating salts used for quick breads and cakes. These salts include soda, which reacts with some acidic constituent of the food to produce carbon dioxide; baking powders, which contain soda and some acidic constituent of their own; and ammonium carbonate, which decomposes by heat to carbon dioxide and ammonia.

Among the physical leavening agents may be included: (1) Air which is incorporated in such emulsifying materials as the egg white of soufflés and angel food cakes and the fat-sugar mixture of various pastries; and (2) steam, which is generated in appreciable quantities in very thin batters and doughs. Alcohol, which volatilizes more readily than water, has been used as a leavening agent in special cases. The puffing of cereals might well be considered as a simultaneous cooking and steam leavening, the steam either being forced into the grain by a pressure which is then suddenly released, or generated inside the kernel by heat as it is in the popping of popcorn.

Shortening

The process commonly known as shortening consists of the addition, to a dough, of insoluble fats which are adsorbed to the gluten particles, thus lubricating them and making the structure less tenacious so it can be broken or crumbed more easily.

Gel Formation

There are a number of different edible gels, the one used depending on the character of the material to be incorporated. For example, an acid starch gel would eventually break down from hydrolysis; and, for reasons of flavor, gelatine could not be substituted for egg in a custard. Among common starch gels are included gum drops, puddings, and, in lower concentrations, gravy and sauce thickenings, also salad dressings. Fruit jellies are pectin gels. Gelatine is used for molded desserts and salads, and egg for custards.

Coagulation

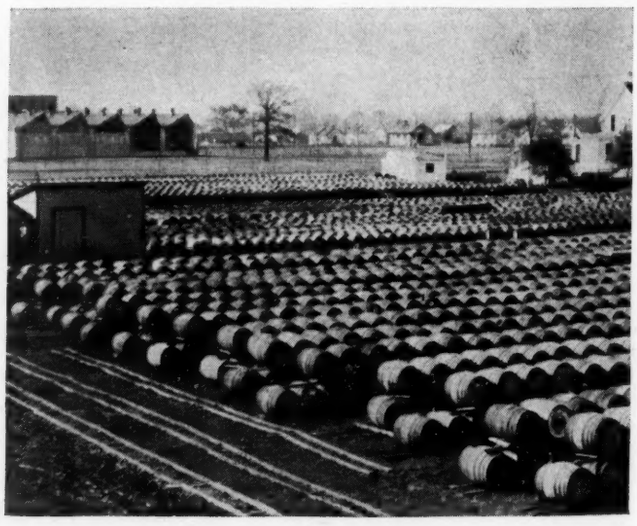
Coagulation is effected, presumably, in two steps, dehydration or denaturation of the colloid, followed by electric discharge, and these steps may be brought about by either enzymes, chemicals or heat. Examples of chemical and enzyme coagulation, respectively, are acid and rennet coagulation of milk for cheese, the latter method having the advantage that it also adds the proteolytic enzyme pepsin. Heat is used to coagulate such protein systems as egg custard, and the doughs of breads and cakes. In the latter two the proteins are contributed both by the flour and any eggs which may be added.

Extraction

In food materials, extractions are usually carried out for the purpose of transferring flavoring ingredients, and possibly nutrients, from a solid to a liquid. Common examples are the making of soups and such beverages as coffee and tea, the manufacture of gelatine and flavoring extracts, and extraction of oil from soybeans and caffeine from coffee. The importance of understanding the principles of the process are well illustrated in the making of the beverage, tea, where the best flavor is achieved by a delicate balance between the relatively soluble, desirable flavoring ingredients and the more slowly soluble, undesirable bitter tannins. This balance is controlled by attention to temperature of the extraction water and to time of extraction, or steeping, an oversteeped tea becoming bitter from too much tannin.

Cooking

As for cooking—frying, broiling, baking, roasting, boiling and steaming are merely different ways of applying heat, but they produce or bring out different flavors, the natures of



Two examples of the unit process of preservation: Left, by heat in retorts; right, by salting in barrels.

which are not well understood. The principal physical changes brought about in food materials by cooking are probably denaturation of proteins, hydration of starches and softening of connective tissues.

Crystallization

The manufacture of candies and ice creams is associated largely with controlled crystallization. Candies are, in general, supersaturated sugar-water mixtures, with or without milk or egg proteins, fat and flavoring. The desired degree of supersaturation is produced by dissolving the constituents, boiling to a definite concentration, and cooling to room temperature (at which the mixture is supersaturated with respect to sugar), meanwhile controlling the crystallization by beating, use of protective colloids, or other means. In clear candies, the same principles are used, but steps are taken to prevent any crystallization whatever. In ice creams, the constituents are mixed at room temperature and then chilled to the point where ice crystals form and the fat particles solidify. Crystallization is controlled as in candy.

Flavoring

Flavoring, probably the most important of all the processes, can be considered only as the blending of different flavoring ingredients to give the desired finished flavor. Among flavoring ingredients are the condiments, acids, sugar, the natural flavors of the raw materials, and products of fermentation.

Emulsification

Common food emulsions are the oil-water or oil-water-egg emulsions of mayonnaise and oil-water-starch emulsions of gravies and salad dressings. The fats in cream puff fillings and, to a lesser extent, those used for shortening of cakes are also emulsified. The principles governing the formation of emulsions therefore govern the manufacture of these products, particularly salad dressings.

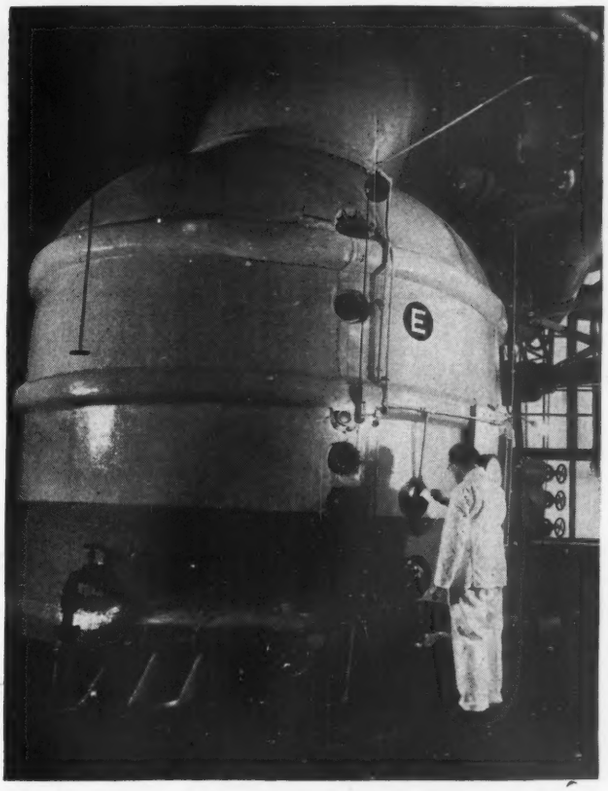
Preservation

Preservation has been divided into microbial control and enzyme control, although the former is probably, in reality, merely a specialized case of the latter.

The deleterious effects of microbial spoilage of food products are due chiefly to the action of those enzymes which the organisms secrete as they grow and multiply. The principal purpose of preventing microbial growth, then, is to prevent the production of these enzymes. It also appears that the steps taken to prevent microbial growth are, fundamentally, steps which either destroy or render inactive the cellular enzymes whose activities make it possible for the organisms that are present to grow and multiply.

Among the methods commonly used for microbial control are: Heat, as in pasteurization and cooking; chemical preservaties, such as sodium benzoate and sulphur dioxide; high acidity, utilized in fruit juices and soft drinks; high salinity, used with certain pickles; and high osmotic pressure, utilized in the production of candies and dried meats.

By enzyme control, as used here, is meant control of enzymes naturally borne in the food products, or in some added ingredient such as malt.



Example of the unit process of crystallization. Sugar is crystallized by removal of water in a vacuum pan.

About the only method used to date for enzyme control seems to be destruction by heat, but there is no reason to assume that some of the other methods used for microbial control might not well bear consideration.

Examples of the importance of enzyme control are the necessity of destroying certain pectic enzymes in order to prevent gradual destruction of the natural emulsions in preserved citrus fruit juices, and the blanching of fruits and vegetables to destroy certain enzymes prior to quick freezing or dehydration. Another is the regulation of the character of beer by varying the mashing temperature to allow one enzyme or another to play the major rôle.

As examples of how these unit processes might fit together we may take the manufacture of a bread, which would consist of making a starch-gluten-water system from flour and water, shortening and leavening, and by baking, with attendant heat coagulation. Wine manufacture would consist of fermentation and aging, and cheese making would consist of coagulation, fermentation and aging.

As an example of the value of studying the basic principles of food manufacture, one need but look to such foreign cheeses as Roquefort and Camembert, the manufacture of which was once thought possible only in a particular locality. But a thorough study of the basic principles has made it possible to produce duplicates of these cheeses in any country or locality, which are probably just as good as the original products.

Because of the complexity to which it would lead, specific references to the sources of the material for this paper have not been made, but a list of the treatises used as source material have been included at the end.

Acknowledgment is due those who made suggestions and corrections during the course of preparation of this manuscript, Drs. Max Levine and O. R. Sweeney of the Iowa State College Bacteriology and Chemical Engineering Department, respectively.

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QUALITY CONTROL

Preventing and Removing Milk Deposits • Official Reviews Bottlers' Problems • Improved Practices Aid Cheese Makers • Need for Catchup Control

How to Prevent and Remove Milk Deposits*

By LEWIS SHERE
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PART I—The nature of milk deposits on equipment and utensils used in processing and handling milk products depends upon the product being processed and the process employed, among other factors. Upon the nature of the deposits depends the methods used to prevent deposit formation or, if formed, to effect removal

DIRT has been aptly defined by the early Greek philosophers as "matter in the wrong place." And even today I know of no better definition. I mean that anything left on the equipment that isn't supposed to be on the equipment becomes dirt. Milk in the bottle is highly prized as a valuable food. The milk that has the misfortune to remain on the equipment is frowned upon and classed as dirt. In handling the cleaning of dairy plant equipment, we are probably more nearly correct if we refer to the contamination as a milk deposit.

Milk deposits may vary greatly in composition. They may range from a film of milk itself to more complex deposits such as we ordinarily think of as milkstone. The type of deposit left behind during the processing of milk or dairy products can be very complex due to the complex physical and chemical nature of milk itself, and the changes which might occur due to difference in temperatures, types of equipment, method of processing and many other factors.

Milkstone Defined

"Milkstone," for example, is one of those words which is used by a great many people to mean one thing and understood by many other people to mean something else. I like to think of milkstone as any contamination on dairy equipment that defies routine daily clean-up methods. In contrast, milk film would then be considered as a type of contamination which can be efficiently removed by regular everyday clean-up operations.

A simple example will perhaps clarify this point. If we take a bottle of milk and pour some of the milk into a glass and then drink the milk, we notice that a slight deposit remains on the glass. However, if we rinse the glass with cold water soon after emptying it, we have little trouble in removing practically all of the milk film. The deposit left on the glass would hardly be considered as milkstone. Now, if we take the rest of the milk from the bottle and put it into a sauce pan and heat it to boiling, and then pour the milk out, we will, of course, find considerably more of the milk adhering to the sides of the pan, and we will also find that this contamination is much more difficult to remove. We would consider this deposit as a mild type of milkstone. It is not easy to draw a sharp line between milk film and milkstone.

There are four general conditions under which milk deposits are formed on dairy plant equipment:

1. Deposited by a cold milk processing.
2. Deposited by heating cold milk.
3. Deposited by cooling hot milk.
4. Deposited as a result of ineffective routine daily cleaning.

We know that when milk is heated, and, for that matter, when hot milk is cooled, certain complex physical and chemical changes take place. These physical and chemical changes tend to cause some of the milk constituents to be thrown out and deposited on the surface of the equipment. This generally is the beginning of milkstone contamination. The amount of deposit produced and its physical and chemical characteristics will obviously depend on such variables, among others, as the rate of flow, the rate of heating or cooling, the amount of milk processed over a specified area of equipment, and the composition of the milk.

Composition of Milkstone

The composition of milkstone varies over rather wide limits because of the variable factors previously listed. However, we can consider milkstone as being an intimate combination of minerals, or inorganic substances, and organic substances. On the mineral side of the picture we find such things

Milk film can be readily removed by proper treatment with a dairy cleaner solution.

* Based on a paper presented on January 5, 1942, in the Dairy Industry Short Course, University of California, Davis, Calif.

as calcium and magnesium, carbonate and phosphate, and, in a lesser degree, silicate. These mineral constituents come both from the milk itself and from the hardness of the water used in cleaning, sterilizing and rinsing operations. The organic constituents obviously come from the milk itself. They consist primarily of casein, other proteins and fat. Casein in certain forms is a very good adhesive or binder. Casein frequently serves to bind contamination together and also causes the entire deposit to adhere rather tenaciously to the surface.

We may consider milkstone as being of several different types. For example, it is known that some milkstones have a much higher percentage of organic matter than others. A second classification would consist of milkstone deposits which have a higher percentage of mineral matter than the average. The third type of milkstone would be a combination of the first two, only in separate layers or strata. For example, we have found that on certain types of pasteurizing equipment there will be formed a thin film of inorganic milkstone right next to the surface, and then a deposit on top consisting of a heavier layer of highly organic milkstone.

To give some indication of the great variation of the composition of milk deposits as encountered under practical conditions, we have selected some data from our records which will serve this purpose. These samples of milk deposit were from equipment where different products were being processed at temperatures of varying degrees.

For comparative purposes, the following is an analysis of a typical sample of untreated whole milk:

CaO	= 0.144 percent
P_2O_5	= 0.203 percent
Organic matter	= 99.390 percent

In contrast to the composition of the milk which would be quite comparable to ordinary milk film, the sources of some other milk deposits and the variation in their composition follow:

1. Milk deposit from a plate heater in which whole milk was heated to 163 deg. F.:

CaO	= 2.54 percent
P_2O_5	= 2.77 percent
Organic	= 93.88 percent

2. Milk deposit from hot well, processing whole milk:

CaO	= 5.77 percent
P_2O_5	= 5.00 percent
Organic	= 86.70 percent

3. Milk deposit from plate heating skim milk to 190 deg. F.:

CaO	= 10.90 percent
P_2O_5	= 8.60 percent
Organic	= 76.80 percent

4. Milk deposit from tubular preheater processing whole milk at 205 deg. F.:

CaO	= 12.00 percent
P_2O_5	= 8.40 percent
Organic	= 79.30 percent

5. Milk deposit from a whey evaporator:

CaO	= 33.20 percent
P_2O_5	= 23.30 percent
Organic	= 26.15 percent

6. Milk deposit consisting of an old accumulation from a tubular heater:

CaO	= 46.50 percent
P_2O_5	= 35.10 percent
Organic	= 18.40 percent

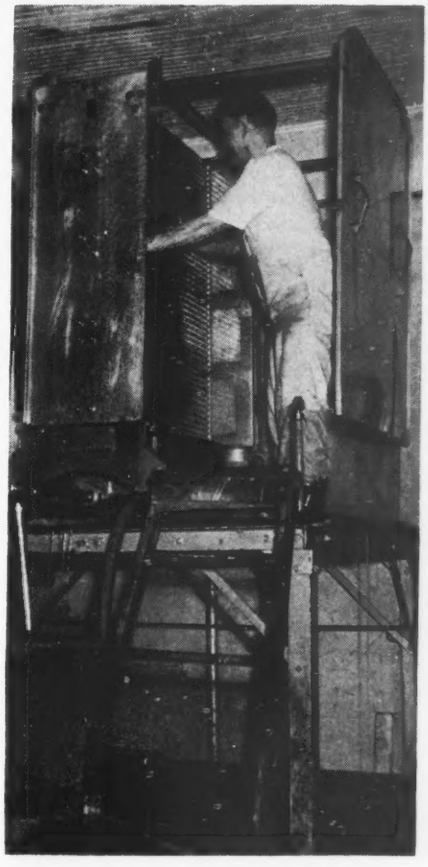
Every dairyman recognizes and appreciates the fact that milkstone is objectionable. The four major objections to milkstone are as follows:

1. *Source of High Bacteria Count*—Milkstone always harbors bacteria and also protects them against the destructive action of both heat and chlorine sterilization. Further, milkstone is very often the source of pin-point bacteria—organisms that thrive and grow in milk even at the pasteurizing temperatures. The development of pin-point bacteria in milkstone makes it possible for the milk to be seeded with these organisms as it flows through the pasteurizer or over the cooler. The only practical means of controlling this bacterial contamination is to remove the milkstone from the equipment.

2. *Milkstone Is Good Insulator*—A layer of milkstone on either heating or cooling equipment greatly retards the flow of heat from the water to the equipment to the milk. It also impairs the refrigerating efficiency. Even a very thin, almost invisible, layer of milkstone will insulate the milk from the heating or cooling medium to a surprising degree. Keeping the equipment free from milkstone contamination results in real economies by the increased efficiency of the heating or cooling equipment.

3. *Milkstone May Cause Off Flavors*—Since milkstone contains organic matter which is subject to spoilage, direct contact of the contaminated milkstone is apt to lead to the absorption of objectionable taste and off flavors in the milk or dairy product being processed.

4. *Milkstone Is Unsightly*—If the presence of milkstone on the equipment is seen by the public, it is obviously of negative value. Further, milkstone on the pasteurizer or cooler does not encourage good workmanship in the plant. It certainly does not provide an incentive for the clean-up men to do a thorough job when they realize that the pasteurizer or cooler is coated with milkstone which is certainly, to some degree, a nullification of the thoroughness of their own cleaning operations.



Efficient, everyday clean-up helps to prevent milkstone deposits.

Our research laboratories have been working on this problem of milkstone formation and control for quite a few years. We have been successful in producing artificial types of milkstone, which have all the characteristics of true milkstone but which can be manufactured on tubes. These tubes on which the milkstone is formed can, in turn, be used in various experimental tests. They may be subjected to milk under a variety of conditions resembling the different conditions met in practical plant operation.

By treating the tubes in this manner, it is possible to develop milkstone accumulations of different composition, thus making it possible to study the efficiency of different methods of removing these deposits.

Just as under plant operating conditions, we found that the composition of these milkstone formations will vary quite widely and that the composition and amount of milkstone formations will be affected by the following factors:

1. *Rate of Flow Through Equipment*—It has been found that the rate at which the milk flows through the equipment influences the amount of deposit formed to a surprising degree. This has particular reference to tubular or plate type equipment, but in general for any given quantity of milk the greater the rate of flow, the less will be the amount of deposit.

2. *Rate and Extent of Heating*—Under identical conditions, the higher the temperature to which the milk is finally heated, the greater will be the amount of deposit. Of at least equal importance is the temperature differential between the milk and the heating medium. In other words, if we heat milk to 150 deg. F. by means of a hot water jacket with the temperature of the hot water at 165 deg. F., we will not obtain as much of a deposit as we would if the heating medium were at a temperature of 190 deg. F. In other words, the less the temperature differential between the milk and the heating medium, the smaller will be the amount of milkstone deposit.

3. *Rate of Cooling, and Temperature From Which Milk Is Cooled*—This factor is quite similar to the one mentioned above regarding heating. The higher the temperature from which the milk is cooled, the greater will be the amount of milk deposit on the equipment. In other words, under identical conditions, cooling milk from 160 deg. F. in contrast to cooling milk from 145 deg. F. will result in the equipment used for cooling the milk from 160 deg. F. showing a heavier amount of milk deposit or milkstone, than where the milk was cooled from 145 deg. F.

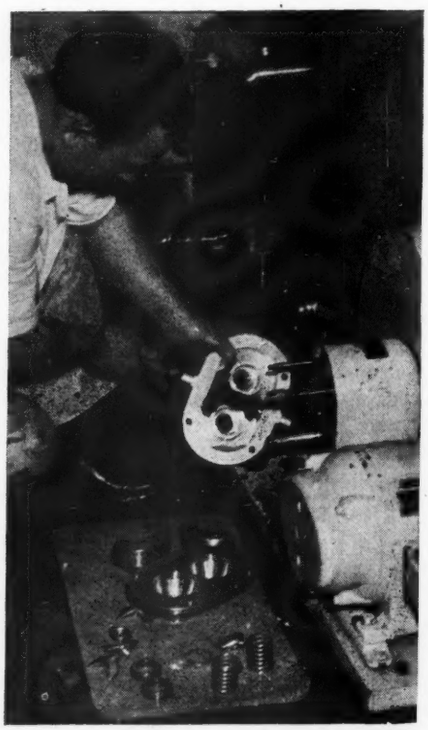
4. *Amount of Products Handled*—The amount of milk handled will naturally have a considerable bearing on the amount of milkstone or milk deposit formed. A piece of equipment may have very little deposit on it after handling 25,000 lb. of milk and the deposit may be of the type which is very readily removed; whereas, if the same piece of equipment handled 200,000 lb. of milk, the resulting deposit at the end of the day will be very much heavier and much more difficult to remove.

5. *Kind of Products Processed*—As a general rule, we find deposit formed on equipment handling cream to be high in butter fat; whereas the deposit formed on the equipment handling skimmed milk, for example, does not contain any appreciable amount of fat, but will be high in casein and in mineral content. Usually, the type of deposit formed in processing cream is much less difficult to remove from the equipment than when processing milk.

6. *Type of Equipment*—The type of equipment has a great deal to do with the formation and composition of milk deposits. For instance, with the plate type heat exchange equipment in which large quantities of milk are handled over relatively small areas, we find that the type of milk deposits which accumulate are different from those on other types of equipment. Similarly, the metal or type of surface involved will have an effect on the deposit formed. A polished surface, such as polished stainless steel, or a glass surface in good condition, will resist deposition more than a roughened or porous surface.

Additional factors that are responsible for milkstone deposits, but are not directly connected with the dairy products being processed are:

A. *Efficiency of Clean-up*—As has been mentioned before, the daily clean-up operations have a great influence on the formation of accumulated milkstone deposits. Sometimes even the most efficient cleaners and the most conscientious efforts fail to minimize completely milkstone build-up over long periods of time. Nevertheless, this is one of the most important factors to take into consideration in preventing milkstone accumulation.



The positive pump is completely dismantled and brushed with a safe milkstone remover.

B. *Hardness of Water*—Hard water contains minerals of very much the same nature as the minerals in milk that form a part of the composition of milk deposits. Therefore, there will always be a greater tendency for milkstone to be found in plants where the water used for cleansing, sterilizing, and rinsing operations is harder than in those plants where the water is relatively soft.

C. *Water Softening Action of Cleaner and Sterilizer*—If the cleaner used for daily cleaning and the sterilizer used for daily sterilizing do a satisfactory job of softening the water, then the minerals in the water will not have a tendency to be deposited on the equipment and, therefore, will not be anywhere near as important a factor in the build-up of milk deposits as would be the case where incomplete water softening of the cleaning solution and the sterilizing solution exists.

D. *Condition of Surface of Equipment*—We have already mentioned the influence of the type of surface on milk deposit formations. The importance of having a smooth, uncorroded surface cannot be over-emphasized.

Where a tin surface has been corroded by corrosive cleaning or sterilizing compounds, or has been roughened through the use of abrasive materials, an ideal conditions exists for the beginning of milkstone accumulation. If the equipment is kept in a properly cleaned, uniform condition, free from scratches, chips, and corroded spots, the tendency for milkstone to gain a foothold is very much lessened.

E. *Routine in Rinsing, Cleaning and Sterilizing*—In any cleaning operations on milk handling equipment, it is important that the equipment be rinsed thoroughly with cold water immeditely after use. This is particularly important with equipment which has been used for handling hot milk. After cleaning, the equipment must be thoroughly rinsed. Then the equipment should be sterilized just before it is used again.

Admittedly, milkstone contaminations are objectionable. What, therefore, are we going to do about them? Milkstone control generally consists of two types of operations. First, proper steps to minimize the formation of milkstone as much as possible, and secondly, proper steps to remove milkstone deposits.

Part II, dealing with specific methods for milkstone prevention and removal, will appear in July.

Food Offical Reviews Wartime Problems Of Bottlers*

By HERMANN C. LYTHGOE
Director, Division of Foods and Drugs, Massachusetts Department of Public Health, Boston, Mass.

Because of the shortage of sugar and tin, the opinions of a food official relative to the objectionable character of saccharin and of copper contamination are important. The author suggests ways to get adequate sweetness even under sugar rationing

THOSE of us who lived during the last war can to a certain extent anticipate what is liable to happen in the present war. When the United States took over the Railroads, unscrupulous people put damaged food into railroad cars. The railroads transported this material to its destination, but the consignee refused to accept the goods, and consequently the United States paid the bills for damage during transit. The Department came in contact with more than one such incident. Meat dealers and proprietors of small slaughter houses held meat for too long a time out of storage, hoping for a rise in price, and when the expected rise failed to occur and the meat became almost unsalable, they sold it. I anticipate, and our experience during the past few weeks indicates, that history is repeating itself and that there will be a substantial increase in the sale to the consumer of decomposed meat and other foods.

When shortage occurs in many foods, substitutes are often sold without so informing the purchaser. The present situation in the sale of "pure olive oil" whose source was a cotton field is an example of sophistication of this character. At present olive oil is worth from $5 to $7 a gallon. Cottonseed oil is worth $1.16 a gallon, but with an olive oil label on a can properly decorated with a foreign landscape, it can be sold at from $2.50 to $3 a gallon, short measure, to unsuspecting people who believe they can get something for nothing.

Food and drug officials of the United States are questioning whether there will be an attempt to put over "ersatz" foods in this country, either by regulatory connivance and attempted emasculation of the law, or by breaking down the law itself. The alternative is to sell the substitutes under their own names and not under the names and designations of other articles. Attempts to change the Food, Drug and Cosmetic Law, legalizing what is now illegal in our foods, probably will be opposed by all the food and drug officials of the country, and should be opposed by all outstanding persons in the food and drug industries.

The Saccharin Question

The composition of carbonated beverages is relatively simple. They consist of carbonated water, sugar, organic acid, flavor and color. Of these materials there is at present a shortage of sugar, and the inquiry has been made, "What about the use of saccharin?" The substitution of saccharin for sugar constitutes a fraud. The article has no food value, and the experiments carried on by the late Harvey W. Wiley and his associates in the old Bureau of Chemistry, as well as the experiments carried on subsequently by the Referee Board of Scientific Consultants appointed by the President, found the article to be injurious to health if used continuously as an article of diet. It has been said that diabetics use it. That is correct, but sick people also use digitalis, strychnine or arsenic, and yet these articles have not been advocated for general consumption as food for those of us who are not suffering from ailments.

Regulations of the Massachusetts Department of Public Health pertaining to the use of saccharin are still in effect, and for this reason it is advisable not to use it and thus avoid expensive litigation.

I have been unable to find any recent Federal decision pertaining to this article, but I would like to call your attention to the Food, Drug, and Cosmetic Act trade correspondence pertaining to monochloracetic acid as an adulterant in foods, and issued under date of December 29, 1941:

HERMANN C. LYTHGOE

"In making this decision we are not unmindful of the fact that competent investigators have determined that in the amounts necessary to exercise a preservative action in various beverages, monochloracetic acid has not been demonstrated to exhibit a significant health hazard. Our interpretation of the statute is that a poison exhibiting toxicity of an order of magnitude comparable with such recognized poisons as bichloride of mercury, carbolic acid and strychnine has no place in foods, regardless of the degree of dilution in which it exists in the articles consumed. The purpose of the Act is to safeguard consumers against the ingestion of any amount of avoidable poison with their foods. It is our conclusion, therefore, that monochloracetic acid constitutes an adulterant in foods, no matter in what amount added, and that a food containing this substance is subject to seizure under the law and its shipper to criminal prosecution."

I am of the opinion that by analogy the same argument should apply to saccharin. I sent a letter to W. S. Frisbie, chief of the division of state cooperation of the Food and Drug Administration, relative to the attitude of that Administration pertaining to the subject of saccharin in soft drinks. Mr. Frisbie replied as follows:

"We have pointed out our inherent objection to the use of substitutes in foods, particularly where these substitutes are worthless from a nutritional standpoint. The

* Based on an address, "Carbonated Beverage Inspections in Massachusetts During 1941," before Eastern Soda Water Bottlers Association, January 13, 1942.

question of injury to health has not been raised. Frankly, we are not disposed to look with favor upon such a request even if it may be legally and equitably granted. . . . At the present time, there is no regulation or announcement on the use of saccharin in food other than that which appeared in TC No. 311, August, 1940, a copy of which was sent you."

TC No. 311, referred to above by Mr. Frisbie reads as follows:

"Use of Dulcin and Saccharin in Food.—In response to an inquiry regarding the use of saccharin for sweetening food, the following reply was made: Saccharin has no food value and its use in food is held to constitute adulteration under section 402 (b) of the Food, Drug and Cosmetic Act unless the article is clearly labeled to show that it contains saccharin, a non-nutritive artificial sweetener, and that it is to be used only by those who must restrict their intake of ordinary sweets.

"If so labeled the article will be considered as falling within the scope of section 403 (j) of the Act, which deals with food for special dietary uses, including food containing saccharin.

"Regarding the use of dulcin (paraphenetol carbamide) in food: Dulcin, like saccharin, has no food value and its use in food is held to constitute an adulteration under Section 402 (b) of the Act, unless the article is clearly labeled to show that it contains dulcin, a non-nutritive artificial sweetener, and that it is to be used only by those who must restrict their intake of ordinary sweets.

"If so labeled the article will be considered as falling within the scope of section 403 (j) of the Act, which deals with food for special dietary uses, including food containing saccharin."

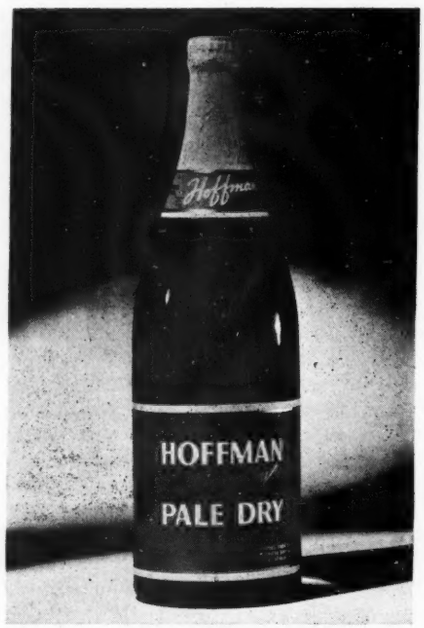
Promote Low-sugar Products

I am suggesting that you advocate as a war conservative measure an increase in the consumption of ginger-ale, particularly the wetter variety or so-called "pale dry," and that you put the soft pedal on the other flavors which require so much more sugar than does the ginger-ale.

It may be possible to reduce the sugar content by cutting down the amount of citric acid. Have you ever tried a lemonade without sugar? You will be surprised. A few drops of lemon juice in a glass of water is almost the equivalent of lemonade made with more lemon juice and considerable sugar. Substitution for cane sugar of d-glucose, known commercially as corn sugar, may be possible. It will give the necessary viscosity; it will give the necessary food value; and with a reduction in the citric acid content to offset the lesser sweetness of the corn sugar, and with the addition of a small amount of cane sugar, it may possibly furnish a very satisfactory beverage. In any event, this suggestion is worthy of a few experiments. Corn sugar is used in the preparation of frozen deserts as well as other foods.

Copper Contamination

Tin has again become a scarce article, and during the last war this scarcity resulted in an increase in the copper content of carbonated beverages. The tin plating on brass and copper was unreasonably thin during that period.



As a war conservation measure, the author suggests that bottlers advocate an increase in the consumption of ginger-ale, particularly the wetter variety, or so-called "pale dry," and that other flavors requiring more sugar be soft-pedaled.

It wore off very rapidly, resulting in considerable exposure of the brass. Since carbonated water attacks brass, there resulted an increase in the copper content of carbonated beverages. The Department had complaints of a few cases of alleged sickness, and in each case there was an excessive quantity of copper in the beverage. There was nothing serious in the sicknesses other than enteritis. Shortly after the occurrence of these cases of sickness, a study was made of the literature pertaining to copper poisoning, and it was mostly pro and con. The late Dr. Mallory, Pathologist of the Boston City Hospital, furnished perhaps the best scientific evidence against the continuous ingestion of copper. The Department is now making a study of the copper content of the carbonated drinks on the market, which will give a series of figures for comparative purposes in the future.

Bottling Plants Inspected

In connection with its enforcement of the laws pertaining to the bottling of carbonated beverages, nearly 400 inspections were made in bottling establishments, not including inspections made in connection with the bottling of spring water. Not all of these places were in a satisfactory condition and it was necessary to hold a number of hearings and to bring a few prosecutions.

The Department has also investigated a number of bottling plants located elsewhere than in Massachusetts, these inspections being made in connection with those of frozen dessert plants operating under a permit system similar to that for the bottling plants. These plants on the whole were in fairly good shape, but the Department has revoked one permit and has placed the permit of another plant under suspension until conditions are satisfactory. In addition, two other plants were given hearings.

Bacterial Content Studied

The Department has carried out a few experiments pertaining to the bacterial content of carbonated beverages. Recently 51 samples were examined, of which 34 contained from 1 to 9 bacteria per cubic centimeter. Fourteen contained from 10 to 63 bacteria per cubic centimeter. The average of these was 11.1 bacteria per cubic centimeter. Two samples gave counts of 102 and 140 and thus raised the average to 15.7 bacteria per cubic centimeter; and another sample gave a count of 3,200, raising the average to 67.5 bacteria per cubic centimeter. We have not as yet been able to account for this large number of bacteria. If the samples were milk, the count would be considered low. Carbonated sugar solutions containing citric acid are not a satisfactory media in which to grow bacteria.

I had occasion to review an article pertaining to bacterial content of coloring matter especially prepared for use in food. The article showed some enormously high-counts, and suggested that high bacterial counts in certain foods which were artificially colored may possibly have resulted from the use of coloring matter of that character. As a result of this article, the inspectors collected solutions, pastes, and so forth, in bottling plants, frozen dessert factories, and other food factories, but the bacterial counts in all of these samples were invariably quite low.

I will summarize our year's work pertaining to your industry by stating that the bulk of the manufacturers are complying with the law.

Improved Practices Aid Cheese Makers

By J. C. MARQUARDT

New York State Agricultural Experiment Station, Geneva, N. Y.

Adequate sterilization of utensils and equipment, better sanitation, mold control, fly elimination and composition control have cut losses and improved quality in cheese manufacture. Other food processors can profit from what the cheese makers have learned

RECENT years have seen a marked change in the cheese industry. For generations this industry was notable for its lack of progress. Now, however, it is out ahead of many other food industries in plant organization and sanitation.

The first change noted was that induced by an aesthetic appeal. Thereafter, neat, orderly and physically clean factories paved the way for real sanitation. Taken together, improved appearance and real sanitary practice have eliminated costly losses from chceese making.

In 1938, the New York State Department of Agriculture and Markets issued a brief circular on the use of chlorine in cheese factories. The information was based on experiences at the New York State Agricultural Experiment Station. Chlorine used as suggested kept equipment "sweet."

However, to keep equipment "sweet" requires more than the use of chlorine. Though it seems incredible, it was common practice a few years ago to wash clothing in a "make" room. This slovenly practice cost the cheese industry millions of dollars. Obviously, the incentive to improve matters was keen when equipment could be kept "sweet" with chlorine. Chlorine not only serves as a deodorant—it also destroys microorganisms. And any chlorine remaining on the equipment after cleaning does not render the food harmful for human consumption.

Poor cheese is often referred to on the market as having an "unclean" flavor. Lately, this has been described as "utensil" flavor. Correctly, it should be referred to as "utensil and equipment" flavor. It is a flavor that finds its way into the cheese from the tin, cloth, wood and whey combinations in the factory. This flavor can be reduced by the use of chlorine.

"Sterilization," as commonly used in the dairy industry, refers to the destruction of most of the microorganisms. Chemicals, heat, or both are used to sterilize, and chlorine is effective in sterilization.

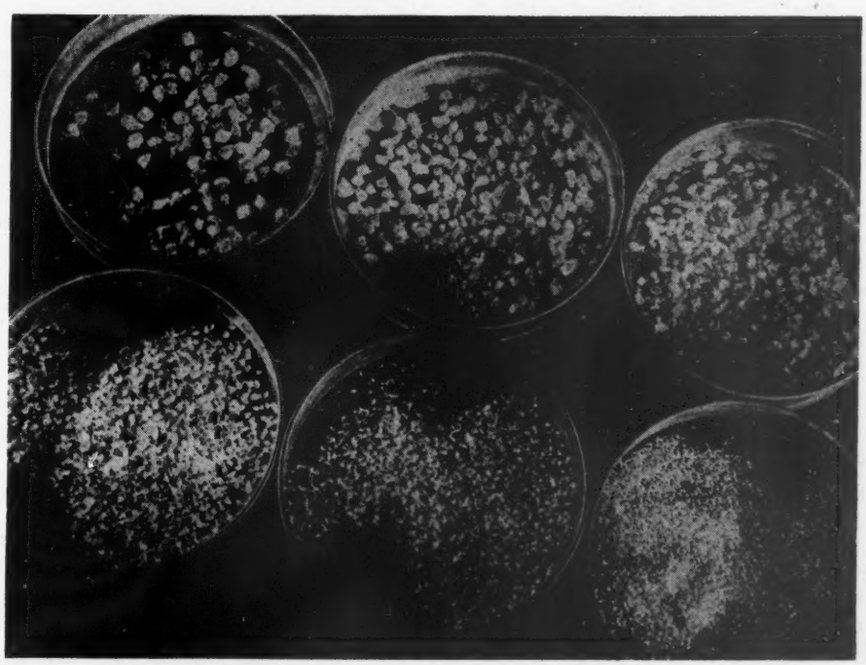
How to Use Chlorine

After the daily cheese making, the equipment should be washed thoroughly, in the regular way. The following morning a chlorine solution is made with cold water to contain 100 parts per million of available chlorine (directions supplied with commercial chlorine compounds tell how to do this). Then the knives, hoops, dippers, strainers, press cloths and other utensils used should be soaked for at least five minutes in the chlorine solution. This is best done by filling one of the vats with enough of the chlorine solution so that all of the utensils can be immersed in it. Before draining this vat, all pieces of equipment should be well rinsed with the chlorine solution. Any other cheese vats that are to be used should be rinsed or sprayed with chlorine solution.

The chlorine solution must be of the original strength to be effective. Presence of dirt or other matter, or dilution with water or any other added fluids will destroy the ability of the chlorine solution to kill micro-organisms. Therefore, great care must be exercised to avoid the introduction of dirt or fluids into the solution.

Patrons' milk cans and can lids should be sprayed or soaked with chlorine solution before being dried and returned. Patrons should also be instructed to rinse their cans, lids, pails and equipment with chlorine solution just before the milking period.

In making experimental cheeses at this station, it has been found that sterilizing with chlorine, as here described, helps greatly in the production of good cheese, by keeping the equipment "sweet." The method is simple and inexpensive. It prevents the imparting of off-odors to the cheese, which may otherwise occur, even when the equipment and utensils have been "sterilized" with hot water and steam.



Which salt shall we use in cheese making? Cheese had been made for centuries before our experiment stations pointed out the close relation between quality and percentage of salt content. Even so, the correct size, shape and solubility rate of salt for the cheese industry have not been determined.

Fly Control

A really effective fly control program has been adopted in the cheese industry, in contrast to the mythical fly control in use in some places. Here, again, the New York State Department of Agriculture and Markets offered its aid with a brief circular. This describes the species and breeding places of flies ordinarily associated with cheese factories. A year-round program of breeding-place eradication is in effect. Doors, windows and make-room entries are being properly screened. Spraying daily in the make-room has eliminated flies. As a result, cheese rejections because of the presence of fly segments in the cheese have decreased.

Mold Control

Simple means of mold control are now in use in the cheese industry. Washing of walls, ceilings and shelves with a 10 percent copper sulphate solution, or a 5 percent borax solution, has been of great aid. Likewise, cheddar cheeses can be dipped in a 5 percent borax solution before being paraffined. Or, if the paraffin is agitated during dipping, the borax can be added directly to the paraffin. This not only controls molds, but also prevents fungus or rind rot from developing.

It has also proved possible, in mixing water paints or cement coatings for cheese rooms, to substitute 10 percent copper sulphate solution for the water. Whether such a paint is used or not, walls and ceilings should be well made and kept well painted. Every possible effort should be made to keep foreign matter and mold from walls and ceilings.

If condensation on the ceiling is hard to control, then the ceiling should be washed more frequently, with the 5 percent borax solution. In any case, walls and ceilings should be washed at regular, frequent intervals with borax solution, after being first scrubbed with soap and water.

Borax should be spread on floors that are washed and kept dry.

Salt Control Essential

Prior to studies conducted at this station, limited attention was given to the importance of a proper salt content in cheese. Salt was added without regard to, or knowledge of, salt control in the finished product. Our studies revealed that cheese with a salt content of 1.2 percent or less cured poorly, regardless of the quality of the milk or the skill of the maker.

Today, over 100,000,000 lb. of cheese are made annually under a salt control program. This poundage will increase greatly over the next few years. The average cheese factory not following a salt control program may lose more than a ton of salt in a year. This is quite a minor loss, however, when compared to quality losses suffered as a result of having improper salt content.

Analyses Show Need For Catchup Control

By D. FRANK HOLTMAN
Department of Bacteriology, Ohio State University, Columbus, Ohio.

Microbiological and chemical analyses made of nine brands and the results tabulated. Findings emphasize need for more careful processing of tomato products and closer quality control

ACCORDING to the definition established by the Food and Drug Administration of the U. S. Department of Agriculture, catchup is "the concentrated product made from the pulp and juice of ripe tomatoes (exclusive of skins, seeds and cores), vinegar, salt, spice and other seasoning, sugar or dextrose or both."

Since catchup might be made from overripe, moldy, wormy or otherwise spoiled tomatoes, this product and the processes attending its manufacture have been for a number of years under the close observation of those engaged in the enforcement of the Federal food laws. Chemical analysis of tomato products has never been of much assistance in determining the condition of the raw materials. Hence, it has been necessary to seek for microorganisms and to set up standards whereby numbers of these forms may be used as a basis for estimating the soundness of the raw tomatoes and the extent of the sanitary practices covering their manufacture into tomato products.

The present investigation covered the examination of nine commercial brands of tomato catchup. The work included some chemical as well as microscopic analyses.

The nine different brands of catchup employed in the investigation were obtained in 1-gal. metal cans, instead of in the usual household sizes of glass containers. The analyses of each brand were made in triplicate.

The microscopic analyses were conducted according to the method of Howard and Stephenson (1917). This method is a revision of the Howard method of 1911, and is now a standard procedure for the microanalysis of tomato products.

Worm fragments were determined by the Howard modification (1935) of the original Wildman method. Recognition of worm parts, consisting of particles of skin, mandibles and hairs, was accomplished with the aid of a Greenough type microscope.

Total solids were determined by maintaining 100-gram samples of the catchups in a drying oven until constant weights were obtained. The salt content of each brand was computed by titration with 0.1 M silver nitrate, using potassium chromate as the indicator. The reaction of each brand was determined with a glass-electrode potentiometer.

Three separate analyses of each brand of catchup gave fairly consistent results, microscopically and chemically. Hence, the findings, as summarized in Table I, represent the averaged results of the triplicate analysis of each brand.

All of the specimens were well within the limits permitted by the Food and Drug Administration as regards numbers of molds, yeasts and bacteria. All contained some worm fragments consisting of bits of skin, mandibles and hairs.

There was considerable variation in total solids among the nine brands. Only three exceeded, and the remainder fell below, the 30 percent minimum total-solids content set by Federal regulations. One of the brands had a high sodium chloride content which probably was of significance in

raising its total solids above the established minimum. All of the specimens were of approximately the same acidity.

Considerable variation was obtained in the color of the different catchups. Most of those having a deep-red color showed a lower microbial content, a higher percentage of total solids, and in general gave evidence of being better products than those of lighter hue. This was regarded as an exception rather than a rule because some unreported observations made on various catchups in this laboratory during the past several years failed to support the finding.

Discussion

Much fault has been found with the Howard and Stephenson method for microscopic analysis of tomato products, and it must be admitted that this method can stand justifiable criticism. Nevertheless, since its adoption, a great improvement has been made in the production of marketable catchups. However, the results of the present investigation indicate that a good product should not be judged on the basis of microbial content alone.

For a period of years the Food and Drug Administration has been aware of the possible use of tomatoes infested with the corn ear worm in the preparation of catchups and purees. Those in authority have pointed out that the use of such material in tomato products places them in the category of filth-laden foods according to the Food and Drug Administration's definition of the term "filth." The prevalence of the corn ear worm seems to vary from year to year, and during some growing seasons this pest is present in such large numbers that extreme difficulty is encountered in keeping it out of manufactured tomato goods. Efforts of the Administration directed toward use of sprays during the growing season and coring of all tomatoes to be made into catchups and purees have helped to control the worm problem, but it is apparent that some worm fragments are still to be found in these products, especially in those prepared during seasons when the worms are particularly prevalent.

The importance of microscopic analyses is evident, but it appears to be equally important that physical and chemical properties be considered in determining the quality of a tomato catchup. Federal regulation and supervision has stopped the use of moldy, or otherwise spoiled, tomatoes in the manufacture of catchup, but it evidently has not succeeded in preventing the appearance on the market of some products of a very watery character. The results show that one brand of catchup contained considerable salt as determined by silver nitrate titration. This undoubtedly influenced the total-solids content of that particular catchup and raises the question of whether the amount of added salt, sugar or spice should be subject to more adequate control. Pederson and Breed (1926) found the salt content of catchups to vary between 1.6 and 3.7 percent.

On the whole, the present findings are in line with these figures. Salt, sugar and spices are added primarily for seasoning purposes, and when one considers the large variety of individual tastes to be satisfied it would seem reasonable to leave the proportions in which these ingredients should be added to the judgment of the manufacturer. However, the addition of large amounts of any one of them could increase the total solids of otherwise watery products sufficiently to permit them to meet the minimum established by Federal authorities. It must be borne in mind, of course, that the established manufacturer would not add ingredients, other than tomatoes, indiscriminately and run the risk of creating an unsalable product from the standpoints of both Federal regulation and consumer appeal.

The importance of microscopic analyses is evident, but it appears to be equally important that physical and chemical properties be considered in determining the quality of tomato catchup.

No comparative studies were made on the same nine brands of catchup preserved in the common household sizes of glass containers. Hence, the results raise another question of whether catchups in containers of large volume, designed primarily for the restaurant and hotel trade, represent the manufacturer's standard product, or if they are inferior or superior to the bottled goods.

The physical character of color should have no particular influence on the quality of catchup. There appears to be no logical reason why catchups made from tomatoes of a light color can not be equal in quality to those made from dark-red tomatoes. Although the deep-red products appeared to conform more closely to the Food and Drug Administration's standards during the present investigation, this observation was regarded as an exception rather than a rule.

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TABLE I—Results of Microbial And Chemical Analyses of Tomato Catchup.

Sample number	Percentage of microscopic fields showing molds	Yeasts and spores per 1/60 cu. mm.	Bacteria per c.c.	Worm fragments per 100 grams	Percentage of total solids	Percentage of sodium chloride	Hydrogen-ion concentration	Color
1	10	11	14,400,000	3	31.2	2.07	4.10	Brick-red
2	33	18	16,800,000	7	24.5	2.09	3.97	Orange-red
3	30	21	31,200,000	5	20.0	2.66	3.99	Orange-red
4	29	28	16,800,000	3	26.6	2.07	4.02	Yellow-red
5	25	13	12,000,000	5	32.9	3.55	3.80	Brick-red
6	17	22	21,600,000	6	29.7	3.84	3.85	Brick-red
7	20	29	18,240,000	8	23.5	2.96	3.92	Orange-red
8	17	18	24,000,000	7	31.2	4.44	3.93	Brick-red
9	20	33	28,800,000	6	26.3	2.94	3.97	Brownish-red
Acceptable standards of FDA	**50**	**125**	**100,000,000**	.....	**30.0**	.....	.....	.....

Directions for Making Cheese Spreads

By C. R. BARKER
Oak Park, Ill.

Can be made in almost unlimited quantities, since aged cheese is not required. Profit greater than for processed cheese. Raw material inventory low and equipment not very costly. Formulas and processing procedure are given in this article

LEASE-LEND demands for concentrated dairy products are cutting in on the supply of aged cheese for use in making high-quality processed cheeses. Yet, the American public need not cut down on its consumption of cheese products. Cheese spreads can be produced in almost unlimited quantities.

An important difference between making cheese spreads and process cheese is in the amount of capital tied up in inventory. Equipment for making and packaging cheese spreads costs a few hundreds of dollars more than for the making and packaging of 2- and 5-lb. loaves of processed cheese. But, that capital expenditure is more than offset by the expense of the large inventory of cheese which processed cheese making involves.

Production of process cheese at the rate of 20,000 lb. per week necessitates a storage supply of eight times the weekly output, or 160,000 lb. of cheese. No storage backlog at all is needed for cheese spreads because the cheese used can be taken directly from current production. The profit per pound on cheese spreads is also greater than on processed cheese because it is less susceptible to market fluctuations, in addition to being affected less by interest and storage charges on inventory.

Cheese spreads are, in fact, combinations of cheeses with condensed whey, whey powder, condensed skim milk, and skim milk powder, or combinations of whey and skim milk. They are appetizing as well as nutritious foods. One precaution to be taken is the avoidance of an excess of milk sugar, lactose, in the finished product.

The leading type of cheese spread is the one made by processing cheese with the addition of skim-milk solids. Desired spreading property is obtained by the addition of water or fat. A standard formula calls for cream or high-fat-content cheese. When desired, the cream cheese may be replaced by aged cheese. In that case the aged cheese is heated to 160 deg. F., smoothed out, completely broken down to a spreading consistency, and added to the mix in quantities called for in the formulas. Some companies making these spreads prefer to mix all the ingredients before putting them into the heating kettle. This mixing is carried out in the machine commonly used by meat packers for mixing a sausage batch. Other companies argue that such treatment is unnecessary if care is taken when the ingredients used are put into the kettle. The premixing does largely eliminate the likelihood of spoiling a batch by carelessly putting the ingredients directly into the kettle. Also as a precaution against an improperly mixed batch, one or two pailsful of the cheese mix should be drawn off and poured back into the kettle before it is allowed to run into the filling machine.

Attainment of correct cooking temperatures is too frequently prevented by inaccurate thermometers and penny-pinching ideas about what is a reasonable cost for a good thermometer. If cooking temperatures are not correctly indicated, much grief may result, for correct temperatures are very important in the making of cheese spreads.

The quality of the milk used in making the cream cheese is also an important factor in making cheese spreads. In those states where the addition of 30 lb. of cottage cheese to the limburger formula is permitted, the cottage cheese may be handled in any way the operator chooses. However, when carelessness prevails and poor milk is used in making the cottage cheese, gas formation in the limburger spread may occur.

Evidence that cottage cheese can be successfully used in limburger spreads can be cited in several instances. One firm in Chicago uses cottage cheese in all of his limburger, makes a good finished product, and has an excellent business in it. Another bought a carload of frozen cottage cheese for storage charges, which the owner refused because it had been stored at freezing temperatures by the cold storage company. The purchaser used this frozen cheese quite successfully in his limburger spread.

In general, a cream cheese base is used for spread products. For this cheese base a 6 percent fat milk is used. It is heat treated to 170 deg. F. and held for 30 minutes. Either during this heat treating or later during the cooking of the cheese mix, 1 percent of a good grade of gelatine (calculated on the basis of a 1,000 lb. of mix in which the cheese is to be used) is added. The gelatine holds the cheese curd together during the cooking of the mix and gives a smoother cheese spread than if no gelatine were used.

After the heat-treated milk has been held for 30 minutes, it is cooled to 145 deg. F. and homogenized at that temperature under 2,200 to 2,500 lb. per square inch pressure and later cooled to 60 deg. F. or lower. Twelve to fourteen hours before the curd is to be used, the milk temperature is brought up to 69 to 70 deg. F. and a 5 percent starter is added. The culture used for making this starter is a lactic acid producing organism and can be obtained from any dairy industry supply company. The starter itself should be creamy when added to the milk and should give a smooth curd with a rich creamy flavor.

Before a cook is made using this curd, an acid test should be made on the entire soft curdled mix. In the Nafis test, a 9-c.c. pipette is stuck into the unbroken curd and drawn full to its calibration marking. The 9-c.c. of test material is run into a test cup,

the pipette refilled to the mark with distilled water, and again emptied into the test cup when the curd clinging to the inside of the pipette has been loosened. The contents of the test cup are then given the Nafis test in the usual manner.

At time of cooking, the soft curd should test 0.65 to 0.70 percent acid as lactic; preferred acidity is 0.68 percent. Usually that level of acidity develops in 12 to 14 hours after setting. The Nafis test may be checked by running an acidity test on 9 c.c. of whey obtained by drawing soft curd through filter paper. At time of cooling, this clear whey should run 0.45 to 0.50 percent acidity, with 0.48 percent regarded as ideal. This check test on the whey is about 0.20 percent lower than the acidity of the entire curd mix. I, personally, believe the whey test more indicative than the mix test of the actual condition of the curd for cooking.

After the acid test is made, the curd is cooked to 142 deg. F. and held at that temperature for 30 minutes, cooled to 60 deg. F. or below, drawn off into boxes or bags placed in ice water, and held for 2 to 3 hours. Then the ice water is drawn off and the curd packed in the ice-filled tank overnight. The drain of the tank is left open to permit the melted ice and the whey trapped in the curd to drain off. Best results are obtained by emptying the curd into butter tubs and holding for 24 to 48 hours before using in the cheese-spread mixes.

Rennet is left out of the mix because: (1) The mix can be consistently cooked to 142 deg. F. without separation. The finished curd is close bodied and does not open up when it gets warm as does curd made with rennet. Also, it retain its original flavor when put back into the cooler, a property which seems never to obtain when rennet is used. (2) Curd made without rennet has less tendency towards surface spoilage, and the finished cheese spread appears to develop a better cured flavor than when made with rennet.

Cream cheese curd made in this manner is used in any number of blends. Often a pH is run on the curd before using and found to be from 4.10 to 4.60. At this stage of the procedure, an indication of total acid content is wanted, not merely the lactic acid content. Upon the amount of acid present depends the keeping quality of the finished cheese spread.

The acidity is standardized to the desired level while the mix is in the kettle and just before packaging. Either citric or phosphoric acid is used when the acidity is too low. If the acidity is too high, which is seldom the case, sodium bicarbonate is added.

To this cream cheese base is added such constituents as pickles, olives, or pimentos, or such cheeses as limburger, Camembert or cheddar, and supplementary flavors. The amounts added vary, depending upon the market in which the spread is to be sold, and at what price. Whatever the blend, the mix is usually cooked to 170 deg. F. or to a temperature at which the spread will flow without acquiring a deleterious flavor.

In some instances emulsifying salts and gum stabilizers are added. The gum stabilizer is not needed in the limburger spread. In other spreads a buffer is needed because of rapid gain or loss in acid or alkali, which leads to trouble with fermentation. A buffer or gum stabilizer retards or prevents the change in acid or alkali reaction of the spread.

Imported gums from the Orient give best results, but wartime conditions will likely make them unobtainable. Pectin is one domestic substitute that is not fully satisfactory but warrants more investigation.

Jars used for packaging must be clean, hot and water-free when filled. They are put into that condition by being sprayed with boiling water in a compartment and run through a heated-air zone before going directly to the filler. When so treated the jars are too hot to be handled manually. However, they must be closely inspected as they move along on conveyor to make certain that the heated air has freed them from the hot-water spray.

The jars are sealed as soon as filled, labeled, packed into shipping containers and held at room temperature for 12 hours before placing in the cooler. Covers should not be loosened until the spreads are to be eaten. In previous years an attempt was made to market these spreads through the ten-cent stores without any success. So many covers were loosened during handling that returns because of mold growths made dime-store selling a liability.

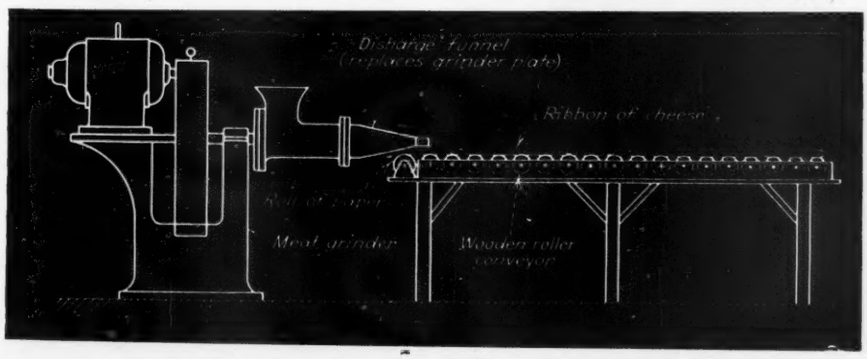


Fig. 1. Arrangement for extruding cheese spread in "ribbon" form. Perforated plate of meat grinder is replaced by extrusion funnel. Helical screw in grinder forces cheese spread through funnel and onto strip of paper on roller conveyor. The paper may be the same as used on an adding machine. The extruded mixture forces paper strip along conveyor. The extruded cheese spread is cut into desired lengths and put onto trays for transfer to chilling room.

Condensed Whey For Cheese Spreads

Condensed wheys vary in analysis, but in general they fall within the following limits:

Lactose (milk sugar)	46 to 52 percent
Milk minerals	8 percent
Protein	7.75 percent
Fat	0.25 percent
Lactic acid	2 percent
Water	30 to 36 percent

Because whey contains approximately one-half of the solids of the milk from which it comes, it is highly nutritive but possesses characteristics that have retarded its use in human foods. It lacks an appetizing flavor or taste, and its high ash content results in an objectionable taste in most foods if the whey content is increased to appreciable proportions.

Whey solids are used as an emulsifying agent in salad dressings, as a constituent in canned soups, and as a flavor intensifier in candies as well as in cheese spreads. Inclusion of whey solids in tomato soups permits the soups to be boiled and held hot without danger of protein curdling or lumping. In candies they decrease the cloying sweetness in addition to intensifying a pleasing milk flavor and adding to the nutritive value of the candy. In cheese spreads they impart a combination of effects and desirable properties.

Vinegar-sugar Solution

Cider vinegar	3 lb.
Sugar (granulated)	2 lb.

Heat slightly and gently if necessary

to hasten the solution of sugar.

Gum Paste

Gum	1 lb.
Water (approx.)	20 lb.

The gum may be tragacanth, Karyara or locust bean. The proportion of water to use is not arbitrary. The moisture content of the air-dry gum varies. Experience with gum mixtures is helpful. The mixture must not be too thick nor too thin. An egg beater or similar device is helpful in getting the gum and water combined into a smooth-textured paste.

Pimento Cream Spread

Cream curd from 6 percent fat milk	252 lb.
Pimento through 5/16-in. grinder plate	62½ lb.
Vinegar-sugar solution	40 lb.
Gum paste	31 lb.
Salt	5 lb.
Cheese color	6 oz.
Cayenne pepper	1 1/3 oz. (37 grams)
Sugar (granulated)	4 lb.

Mix thoroughly before putting into cooking kettle. Heat to 170 deg. F. Run through filling machine into sterilized glass containers of desired capacity. Use of emulsifier optional. If used, emulsifiers are: Sodium citrate, 1 percent, or di-sodium phosphate, 2 percent, calculated on weight of batch mix.

Relish Spread

Cream curd from 6 percent fat milk	250 lb.
Sweet pickle relish	60 lb.
Vinegar-sugar solution	40 lb.
Pimento through an ⅛-in. grinder plate	27 lb.
Condensed whey or whey powder plus water	30 lb.
Gum paste	40 lb.

An emulsifier may be used; some operators prefer its use, some do not.

Mix constituents thoroughly, heat to 165 deg. F. or slightly higher, depending upon flavor desired, and run through filling machine into sterilized glass containers of desired capacity.

Limburger Cheese in Glass

Limburger cheese	180 lb.
Cream curd from 6 percent fat milk	60 lb.
Water	10 lb.
Di-sodium phosphate	10 lb.
Salt	2 lb.

Mix thoroughly and heat to 174 deg. F. Run through filling machine into sterilized glass containers of desired capacity.

Preferred way to cook limburger cheese to assure good spreading consistency is to use 80 lb. of soft smooth limburger, 40 lb. of a firm cheese but with a sharp limburger flavor and 60 lb. of limburger with a "clean" but slightly "off" flavor.

Put 70 lb. of this limburger mixture in cooking kettle with steam turned on and heat with stirring until fat begins to separate sufficiently to give a slight glistening appearance to the cheese which pulls together to form a mass.

Add 5 lb. of the phosphate and 1 lb. of the salt, with continued heating and stirring. Add another 40 lb. of the limburger mixture and stir until mass is smoothed out. Add 30 lb. of the cream curd and stir until smoothed out. Add remainder of limburger mixture. Heat and stir until smooth before adding the remaining 5 lb. of phosphate, 1 lb. of salt and 30 lb. of cream curd.

CAUTION: After the first charge of cheese is put into kettle, additions of more than 60 lb. should not be made. Also, subsequent additions should not be made until the charge in the kettle has been thoroughly smoothed out by gradual heating and constant stirring by the mechanical agitator in the cooking kettle. The procedure followed in building up the batch in the kettle may be varied according to the operator's experience and the particular properties desired in the finished limburger cheese mixture.

Special "Sharp" Spread

American cheddar cheese (smooth)	340 lb.
Salt	2½ lb.
Di-sodium phosphate	6 lb.
Condensed whey	84 lb.
Water	40 lb.
Cheese color	To suit

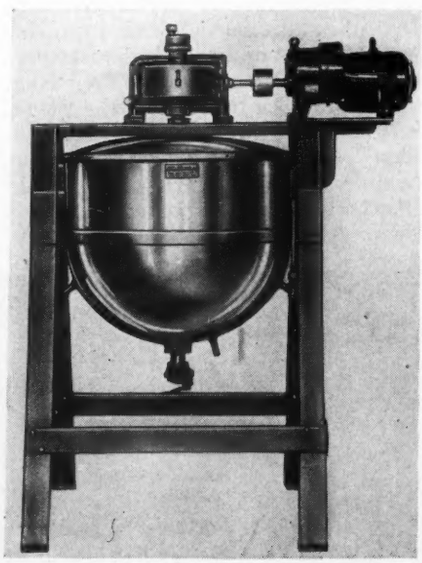


Fig. 2. Agitator type steam-jacketed kettle used for cooking cheese spreads. Contrary to general practice, steam trap (not shown) is placed above lowest point of drainage. This is because hot water is desired in kettle (at temperature of 235 deg.) at a height suitable for cooking. If there is "direct" steam instead of water in jacket, there is a great deal of "burn on."

If needed to firm up the batch 1 to 2 lb. of sodium citrate or of sodium meta phosphate may be added.

The American cheddar cheese should be partly broken down. One-half should be of clean flavor and aged.

Add cheese to heated kettle slowly as in making the limburger product. Add 15 lb. of the water at start. Do not add the condensed whey until after the batch has been heated to about 135 deg. F.

Finish by heating to 160 deg. F. and packaging in containers other than glass. Make into packages similar to those of processed cheeses.

"Supply" Type Cheese

Aged cheese is used. It should have a pleasing nutty flavor, be not too firm nor too soft in texture. Color is of no consequence unless finished product is to be designated as a "white" cheese.

Cheese	491 lb.
Salt	5 lb.
Sugar	4 lb.

If a high-acid cheese is used, molds will grow more rapidly than if a low-acid or neutral cheese is used, particularly in the case of the 4-oz. ground-cheese package. Also, the low-acid cheese permits whipping in of as much as 3 percent water. Development of mold growth can be checked largely through the use of propionic acid or its salts.

The cheese used is first cleaned and ground, as in the making of processed cheese (FOOD INDUSTRIES, December, 1942, page 53), through a 3/32- or ⅛-in. plate. It is then placed in a sausage machine or an upright bowl and beater-type mixer, and salt, sugar, color, other seasoning and water are added, if used. Mix thoroughly preparatory to second passage through grinder in which the perforated plate has been replaced with a funnel (see Fig. 1) of predetermined shape and size to give desired extrusion cross section.

As the helical screw in the grinder forces the ground mixture through the funnel, it is caught on a strip of paper of required width which reels off a roll as the extruded mixture forces the paper strip over a roller conveyor about 6 ft. long.

The paper supports the extruded cheese until it is cut into desired lengths and put on trays for transfer to cooler or chilling room.

When the cheese lengths on the wooden trays have been in the cooler sufficiently long to become firm, they are divided into 3- or 4-in. portions to

give a 3½- or 4-oz. net-weight package. If dipped for about 10 seconds in an 8 percent solution of poprionic acid before wrapping, development of mold growth will be negligible. A company following this procedure sells 2,400 doz. 4-oz. packages weekly, which is evidence of the popularity of the product in that company's marketing area.

Smoked Cheese In Sausage Casing

Use only processed cheese. Heat cheese until an emulsion forms as in processing for loaf cheese and then, while hot, force through standard sausage stuffer into the Visking No. 2x20-in. red fibrous casing. Chill until solid. Place in smokehouse and subject to a hickory smoke for 48 hours at as low temperature as possible to obtain in smokehouse.

Remove from smokehouse and cool for 12 hours at room temperature.

If desired, the finished product may be wrapped in a decorative or trademarked transparent sheet.

Also, a sharp, snappy natural cheese may be used instead of the processed cheese. In that case the cheese is cut up, ground through a ⅛-in. plate, and worked in the same machine as meat packers use for sausage or in a large vertical bowl type mixer and at the speed as used in creaming butter.

The natural cheeses are not heated as in the case of processed cheese but transferred from the sausage machine or mixer bowl into the stuffer. Stuffing, smoking and cooling procedure is same as when processed cheese is used.

The mechanically worked natural cheese may be made into 2- or 5-lb. loaves, held for 48 hours, cut into four pieces, smoked and wrapped. This product has good demand in eastern markets at present.

How To Calculate Gallon Weights Of Dairy Products

By A. J. HAHN* and P. H. TRACY
Department of Dairy Industry, University of Illinois
Urbana, Ill.

Simple and accurate method of computing the weight per gallon of ice cream mixes, condensed milk and other products

ON numerous occasions knowledge of the weight per gallon of ice cream mixes, condensed milk and other milk products is desirable. Existing tables are not sufficiently complete to give the information covering all cases.

For that reason a simple, accurate method of arriving at weight-per-gallon values should have practical application and fill a need. The formula given in this discussion was derived from the values obtained by measuring the specific gravities of 53 different combinations of butterfat, serum solids and sugar, and found to be reasonably accurate. A minimum of five samples of each combination was used. All specific gravity determinations were made in triplicate on a Westphal balance.

Pasteurized milk products were used in the preparation of the various combinations. Homogenized cream was used as the source of fat while skim milk and condensed skim milk supplied the serum solids. The calculated amounts of each product were thoroughly mixed and heated to 140 deg. F. for 10 minutes. The mixture was then cooled to 40 deg. F. and stored for 24 hours before specific gravity measurements were made at 5, 10 and 15.6 deg. C.

The calculated formula based upon a statistical analysis of these determinations is as follows:

Specific gravity at 5 to 15.6 deg. C. =

$$1 + \left\{[(4.87 \times \%\ \text{sugar}) + (4.41 \times \%\ \text{serum solids}) - (0.88 \times \%\ \text{fat}) - 6.26] \div 1{,}000\right\} - (T^\circ C. - 5)(0.0003)$$

Specific gravity × 8.34 = weight per gallon.

To compute the Baumé reading the following standard formula can be used:

$$\text{Baumé} = 145 - \frac{145}{\text{Specific gravity}}$$

Using scales accurate to within 0.02 lb., a series of milk products were weighed to check the formula at 60 deg. F. A 2,000-c.c. flask was weighed empty then placed in a refrigerator with the product to be weighed. The flask was filled approximately to the 2,000-c.c. mark, the product and flask tempered to 60 deg. F. and the contents adjusted to exactly 2,000 c.c. The flask and contents were then weighed. From the weight of 2,000 c.c. the weight per gallon was determined. From the composition of each product the weight per gallon was calculated using the formula. The results are given in Table I.

As an example of how the formula can be used, the following problem is presented:

Making a mix in the vacuum pan is desired. This mix is to contain 12 percent fat, 11 percent serum solids, 14 percent sugar, 0.4 percent egg yolk* and 0.35 percent gelatine.* What will be the weight per gallon of this mix and the Baumé reading at 60 deg. F. (15.6 deg. C.)?

Solution: Specific gravity of mix equals

$$1 + \left\{(4.87 \times 14) + (4.41 \times 11.75) - (0.88 \times 12) - 6.26] \div 1{,}000\right\} - (15.6 - 5)(0.0003) = 1.10$$

$$\text{Weight per gallon} = 1.10 \times 8.34 = 9.17 \text{ lb.}$$

$$\text{Baumé} = 145 - \frac{145}{1.10} = 13.18 \text{ deg.}$$

In the same manner specific gravities or weights per gallon of other milk products can be calculated. While the calculated values may not check exactly with those determined by laboratory methods, the method presented gives results considered sufficiently accurate to be of practical use.

* These solids can be considered as serum solids in the formula.

TABLE I—Weights Per Gallon as Measured and Calculated.

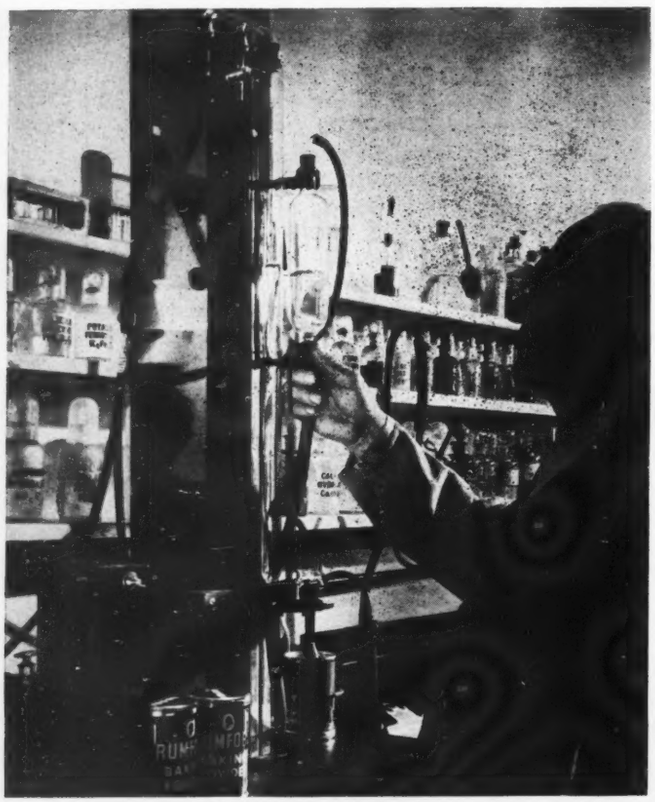
Product	% fat	% serum solids	% sugar	Calculated wt. gal.	Actual wt. gal.
Whole milk	4.0	9.0	0	8.58	8.59
Mix	10.26	13.25	14.0	9.24	9.24
Mix	12.00	11.06	14.0	9.13	9.13
Mix	15.92	9.06	15.0	9.11	9.07
Cream	39.83	5.30	0	8.15	8.11
Concentrated whole milk	8.34	18.36	0	8.90	8.90
Condensed skim		30.90	0	9.43	9.40

1 In these mixers, phosphoric acid, derived from Florida phosphate rock, is converted into granular calcium phosphate. Rumford baking powder is of the calcium phosphate type.

2 Here the phosphate is being milled. The other two ingredients, bicarbonate of soda and cornstarch, are made to specifications by other companies which have been supplying Rumford since the 1860's.

PICTURES OF

This is more than a story of how baking
Works, Rumford, R. I. It is a story of
nated and of careful control of the quality of
container. There is even a merchandising

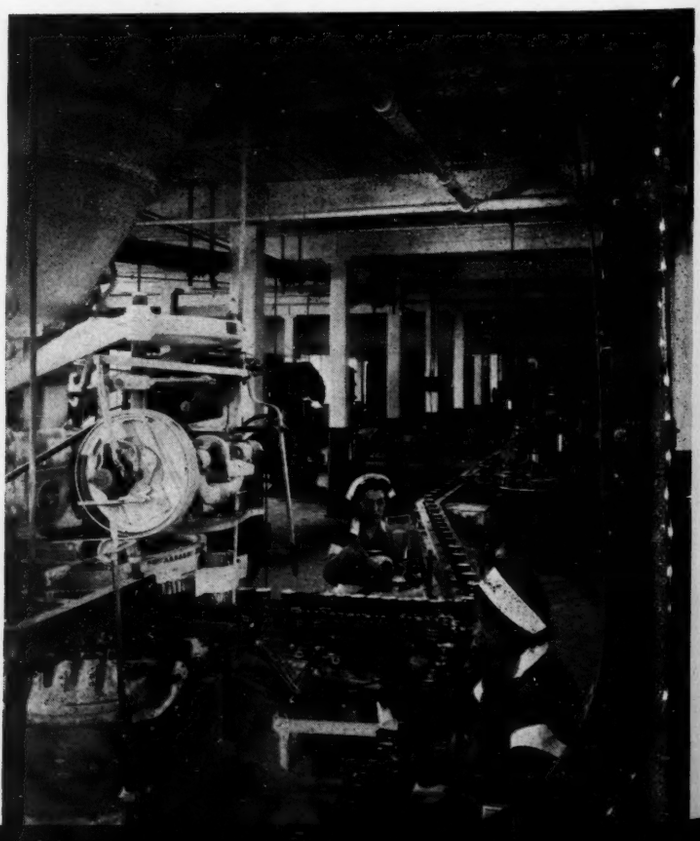


5 No less than 52 tests check the purity and correct mixing of the baking powder, and one of these checks is the actual baking of test biscuits. The containers are also tested, as in this measurement of the porosity of cans.

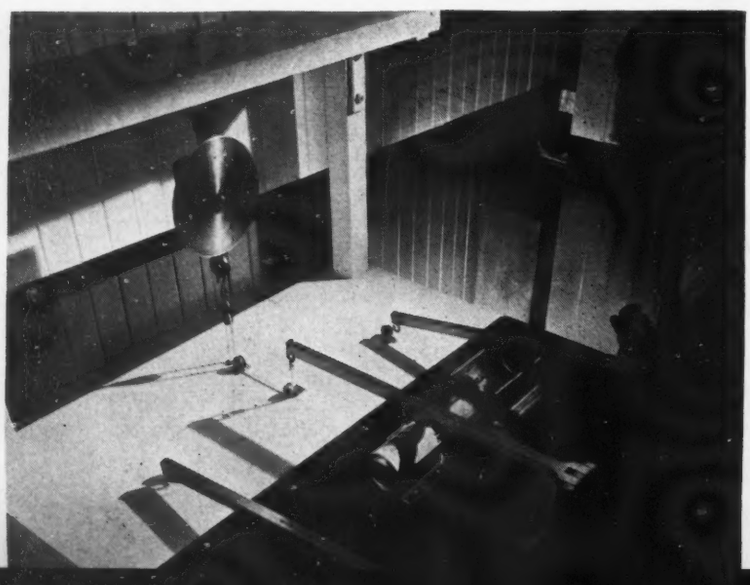
Photos courtesy of
RUMFORD CHEMICAL WORKS

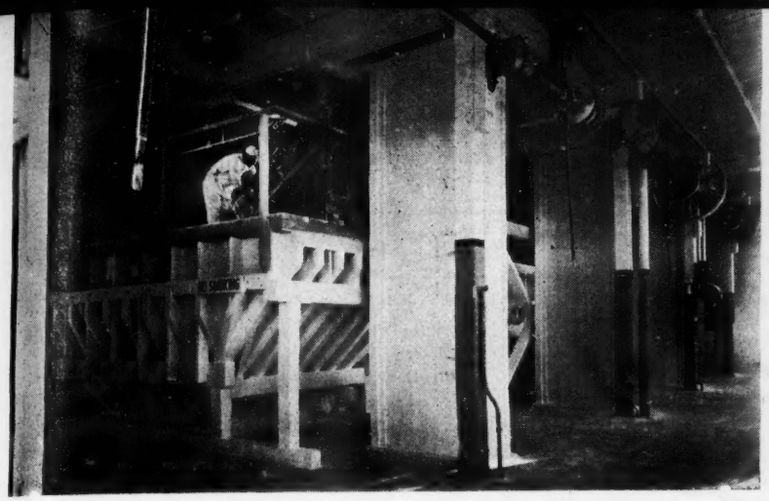
Photography by Ezra Stoller

7 Filling is in two operations. The can is two-thirds filled, then agitated to release trapped air, and filling is completed. Next, the weight is checked, the bottom is applied to the can and the container goes along to the packing line.



6 Testing cans for strength is a regular operation. Rumford began two years ago to prepare for a possible tin shortage, and it is now in a relatively comfortable position with regard to containers.



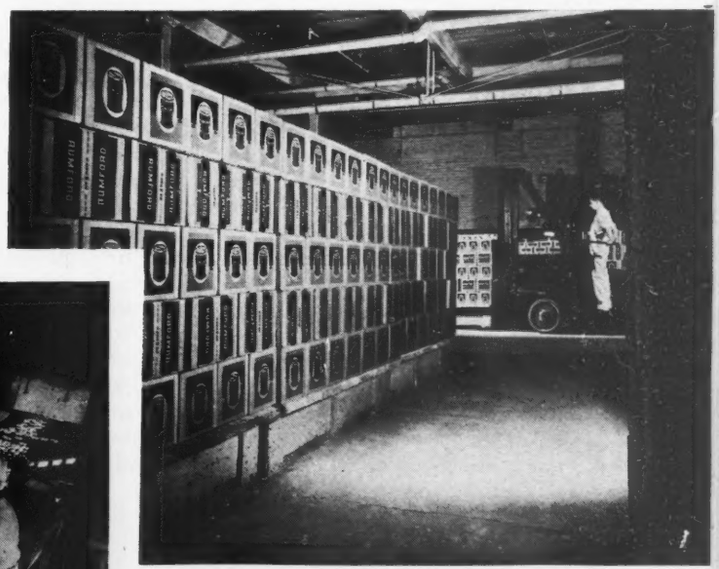


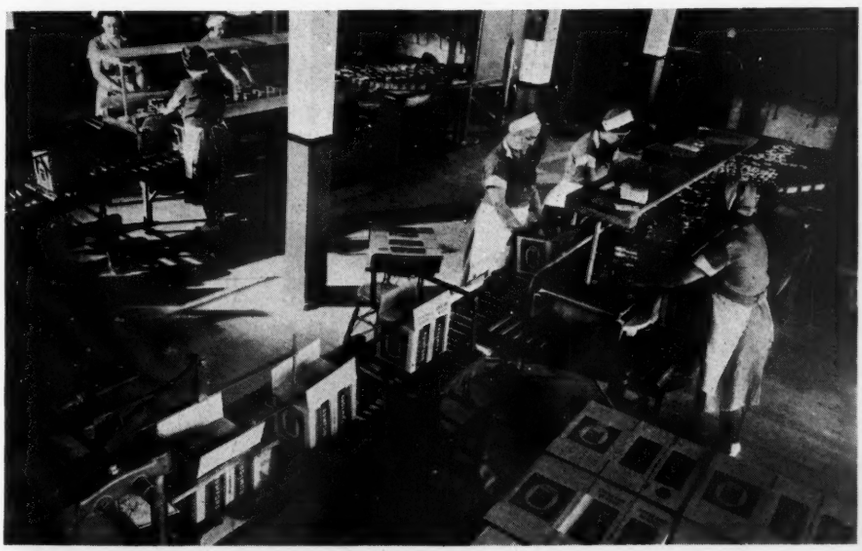
3 Ingredients are taken to the top floor in bucket elevators, mechanically sifted and fed into storage hoppers. Underneath are weighing hoppers which measure the ingredients into mixer cars.

4 Each mixer moves on a track beneath the hoppers and handles two tons at a time. This mixing is a vital part of the process. Too little or too much mixing means an unstable product. And the uniformity necessary in each consumer-size can must be attained throughout the two-ton batch. When mixing is completed a sample is taken to the laboratory, and on the mixer car is placed a red flag which cannot be removed until laboratory approves sample.

PROCESSES

powder is made by Rumford Chemical
efficient unit operations effectively coordi-
the product and the serviceability of the
idea here for good measure





10 Cartons are stored prior to shipment on wooden pallets set in position by electric tiering trucks.

8 The filled cans are packed in printed cartons. A current Rumford innovation is the new divisible carton, designed to eliminate the jobber's nuisance of split cartons which result in loose cans.

9 Discovering that over 40 percent of cartons are split by jobbers and warehouse men, Rumford devised the twin-unit carton. When sliced through the middle, this separates into two complete cartons of 12 cans each, so labeled.

11 Loading the cartons into a freight car, with the aid of a portable roller conveyor to eliminate carrying. The company has its own railroad siding, and carload lots are loaded steadily.

Cause and Prevention Of Explosion Hazards

By THEODORE A. COHEN
Chief Engineer, Wheelco Instruments Co., Chicago, Ill.

Equipment is sometimes wrecked and employees injured or killed by the explosion of unburned fuel-air mixtures in boilers, ovens and driers. But safeguards have been developed to prevent these disasters. What they are and how they work are described here

ONE of the most serious hazards in the food industry today is the possibility of explosions in boilers providing heat and process steam, and in direct-fired baking and drying units. They may involve injury or death to employees, as well as physical damage to equipment, breakdown in production and disablement of other parts of the plant and equipment by fire resulting from the explosion.

The national war program has drawn heavily upon all industries for skilled labor, and, in many cases, has made it necessary to transfer to relatively new hands responsibilities for firing boilers and furnaces and for tending ovens. This has materially increased the danger of explosions, and makes more desirable proper combustion safeguards that are more trustworthy than the human operator in preventing explosions under unexpected circumstances.

Reliability of present-day safety equipment has been proved in applications ranging from very small ovens to the largest boiler furnaces. And it can be provided at a cost within reason when compared to the cost of equipment and plant given protection.

Of the four most common fuels used by the food industry—gas, oil, coal and electricity—gaseous fuels are generally considered of greatest potential hazard. Yet they are often treated with more carelessness than seemingly less hazardous fuels. Explosions with electrically fired equipment, while uncommon in the food industry, have taken place in industrial drying ovens where solvent vapors are given off in the drying process.

Records of one underwriting organization show, during a given period, 44 explosions in oil-fired boilers, 13 in gas-fired and 12 in boilers fired with pulverized coal. These figures do not prove oil-fired equipment more unsatisfactory from a safety standpoint, as there was a more widespread use of that type of equipment in the risks covered, but they do show the hazard to be serious in each of the three types of fuels most generally used.

Further analysis of these explosions indicates that 45 percent was due to lack of burner safeguarding, or lack of flame-failure safety equipment; 35 percent to defective burner operation, including clogging; 8 percent to poor burner maintenance; 3 percent to distribution deficiencies; and 9 percent miscellaneous and undetermined.

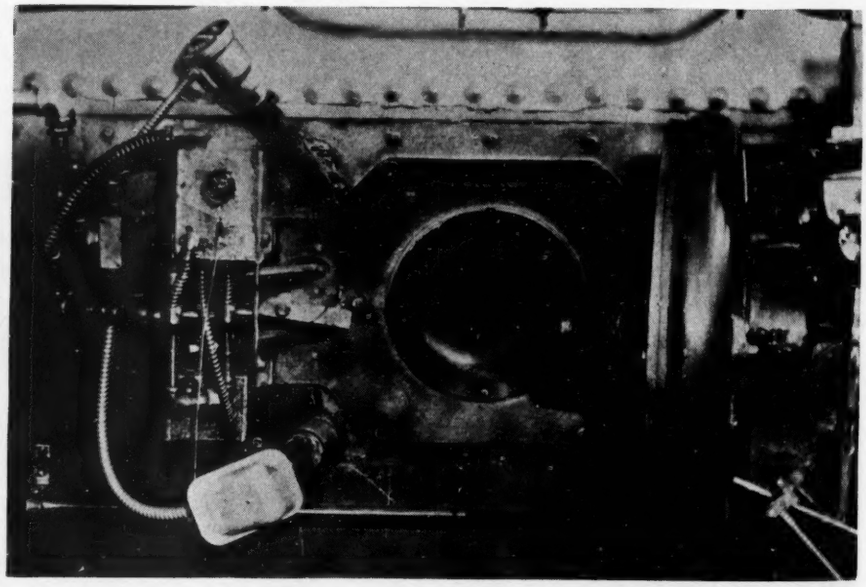
While mere use of a fuel does not make for explosion in every case, no furnace or oven, and no fuel, is immune from possible explosion hazards. Explosions occur in home furnaces as well as in industrial boiler furnaces.

Starting Danger

The greatest number of explosions in both furnaces and ovens is in starting, particularly in gas and pulverized-coal units. Fuel may leak past valves in the burner lines, to accumulate in the combustion chamber of a furnace or oven where an explosion may result on insertion of the lighting torch. Likewise, unburned fuel, in the case of oil and pulverized coal used to fire a furnace, may accumulate in the combustion chamber, and the gas distilled from it, upon mixing with air, may produce an explosive mixture that can be ignited during the lighting procedure.

Ignition may be accidentally lost with decrease in fuel feed, or lost with stoppage of fuel, and then fuel feed resumed without repeating the proper lighting cycle. A part of the furnace may maintain sufficient heat for a short time to ignite the reestablished fuel and cause an explosion.

A third explosion cause is a decrease in air supply to an extent where unburned fuel may accumulate in the



Installation of combustion safety equipment on an oil burner. An electrode, slightly above and to the left of the burner door, reacts to a gas-burning pilot light, opening the fuel line valves when the pilot is burning properly. A photoelectric cell entering the combustion chamber just below and to the left of the door, takes over from the electrode, holding the valves open if the burner has been properly ignited, as long as proper combustion continues.

furnace or flues and ignite when proper fuel-air ratio is restored. This occurs more readily with oil or pulverized coal than with gas, and explosions from this cause have taken place in hand- and stoker-fired coal furnaces. Raw fuel entering the combustion chamber may not be completely consumed because of an insufficiency of oxygen brought about by air-supply fan failure or some other cause. The fuel accumulates in some portion of the combustion chamber, and when the air supply is reestablished, the gas in the pocket is diluted to present an explosive condition.

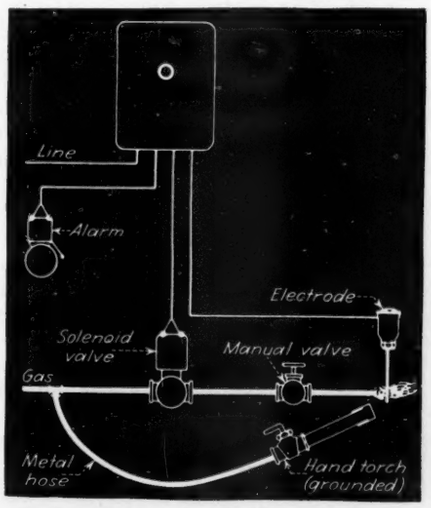
Analysis of these causes point to these conclusions: Explosions cannot occur on lighting if the furnace or oven has been purged of all fuel or hazardous vapors; if, after purging, an ample igniting flame from torch or other source is properly applied to each burner before fuel is turned on; if air velocity at each burner is kept sufficiently low to prevent loss of ignition in starting; if fuel is sufficiently rich to insure immediate ignition from torch; and if, after ignition is established, proper mixture of fuel and air is maintained throughout the entire oven or furnace operation, and stable ignition is maintained at all operation rates.

Likewise, after starting, explosions cannot occur if stable ignition has been attained; if a flame failure at the burner causes an instantaneous shutdown in fuel supply; if failure of the power supply to the burner equipment causes an immediate shutdown in fuel supply; and if a reduction or failure in air or fuel supply causes an immediate shutdown of fuel-supply control means.

Proper consideration of all factors contributing to combustion explosions, both on starting a furnace or oven and after starting, points to the necessity of thorough purging of the combustion chamber before lighting, and to the importance of adequate flame-failure safety equipment.

Purging, particularly required where gas is used, is also necessary in connection with oil and pulverized-coal burning equipment. Pulverized coal or oil entering a furnace that is hot, but below the ignition temperature, may introduce a hazard by distilling gas, which, upon mixing with air, may ignite from hot brick work. There is a wider range of explosive limits where a hot furnace is slightly below the ignition temperature of the fuel, and if the fuel reaches a hot spot, a major explosion may occur with either a leaner or a richer mixture than would explode in a cold furnace when first lighting off. The danger is minimized in water-cooled furnaces, since the furnace is cooled so rapidly after loss of ignition that reignition is less likely than in a refractory furnace. If there is ignition, the lower temperature of the furnace will narrow the explosion range.

Purging is usually accomplished by an air-flow switch in combination with a time-delay relay that together supervise operation of a ventilating fan. The fan may be of an exhaust type, pulling the atmosphere from the furnace for replacement with fresh air, or may blow in fresh air to dilute and eventually force out all gases that might have accumulated in the chamber.



Simple combustion safeguard hook-up for gas fuel, such as would be used on some baking ovens and direct-fired processing units. Flame from the hand torch used for lighting strikes the electrode, causing the instrument to open the solenoid safety shut-off valve. The manual control valve is then opened to admit gas to the main burner. Instantly on flame failure, the solenoid valve is closed and a bell rings.

Flame-failure Safety Device

A flame-failure safety device must cut off the fuel supply to a burner in case of flame failure or loss of ignition, and must provide the cutoff quickly to prevent raw fuel from entering the combustion chamber after the flame failure has occurred.

Early flame-failure devices fall into two general classes, both making use of radiated heat from the flame. One type employs a heat-sensitive member, such as a thermostatic strip or a thermometric bulb with an expansible liquid. This member is exposed to the source of heat, and in turn operates an electric contact to energize the fuel-supply valve, or it might act directly upon such a valve to maintain the fuel flow to the burner as long as heat is radiated from the flame to the thermally sensitive portion of the apparatus.

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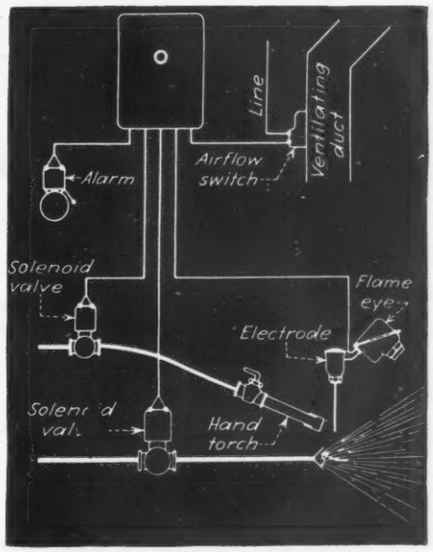
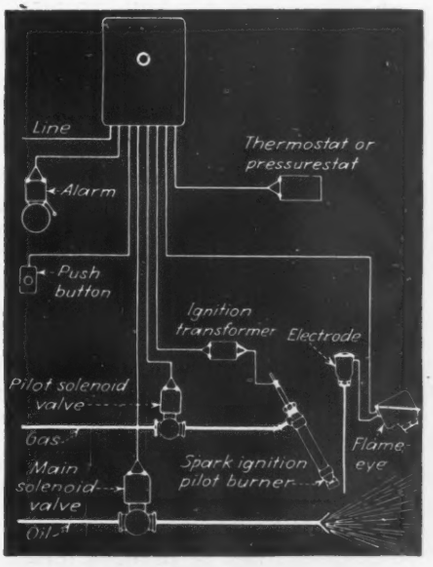


Combustion safeguard for a system burning oil or pulverized coal. The instrument provides a purging period during which the hand torch cannot be ignited. After purging, the hand-torch solenoid valve is automatically opened. The manual valve on the torch may then be opened and the torch ignited. When the torch is inserted through the lighting port so that the flame touches the electrode, the instrument opens the fuel valve. After the fuel has been ignited, the photoelectric cell acts to keep the fuel valve open. A flame failure causes instant shut-off and sounds an alarm.



This combustion safeguard incorporates a controller, either a pressurestat or thermostat. A demand for heat by the controller causes the instrument to turn on the spark ignition and pilot burner. The pilot flame then strikes the electrode, completes the circuit, and causes the oil valve to open and start the flame. After a fixed time, the pilot and ignition are turned off. In case of flame failure, the fuel valve is closed, and a new lighting cycle takes place.

Enzyme-Converted Corn Sirup* Produces Better Glacé Fruit

By DONALD K. TRESSLER
New York State Agricultural Experiment Station, Geneva, N. Y.

How glacé fruit is made and what quantities of corn sirup to use in combination with sucrose for best results are told in this article. Preparation of the fruit, siruping, open-pan methods, use of canned fruit and drying of glacé fruit are discussed

IN recent years, the manufacture of candied fruit and peel has become one of the major fruit byproduct industries of the United States. The industry is centered in California, although considerable quantities are also made in New York, New Jersey, Oregon, Washington, Florida and a few other states.

The variety of fruit used is great, including orange, lemon, tangerine and grapefruit peels, cherries, Maraschino cherries, pineapples, citron, apricots, peaches, nectarines, pears, dates, kumquats, crabapples, figs, Zucca and other melons, plums, prunes, and many others. Candied fruit is used extensively as a confection. It is particularly popular during the season between Thanksgiving and Christmas. Large quantities are utilized, both in commercial bakeries and in the home, for making fruit cakes, cookies and puddings.

Principles of Manufacture

Candied or glacé fruit is made by the immersion of prepared fruit in sirup until the sugar content has increased to approximately 75 percent. The product does not spoil through the action of microorganisms, since the moisture content is so low that yeasts, molds and bacteria cannot multiply rapidly. It is important, therefore, to continue the treatment of the fruit in concentrated sirup until the soluble solids content reaches at least 75 percent, as otherwise the product may ferment if it is exposed to a warm humid atmosphere.

A high sugar content may be obtained rapidly by boiling the fruit first in water and then in sirup of high density, but the product will be shriveled and tough. In order to obtain a plump, soft, translucent glacé fruit of good flavor, it is necessary to increase the sugar content of the fruit slowly, under conditions which will not draw out the moisture of the fruit rapidly. This is done by placing previously boiled fruit first in sirup of low concentration, e.g., 30 percent, and then each day increasing by about 10 percent the concentration of the sirup until it reaches 60 percent. From then on the sirup concentration is increased only every other day or every third day until it reaches 80 percent. Of course, unless special care is taken, sirup of 30 or 40 percent concentration will ferment rapidly, so it is necessary to maintain the fruit under nearly sterile conditions. This may be done by heating the fruit in the first sirup to about 200 deg. F., and then reheating the sirup to about 175 to 180 deg. F. each time its concentration is increased. Most yeasts and bacteria which cause fruit to ferment are destroyed in sirup at 200 deg. F., or in sirup containing fruit juice (*i.e.*, that drawn out of the fruit) at 150 deg. F. or even lower.

The finished product should be plump, soft and translucent, with a high gloss, bright color and good flavor, and should not be too sweet. It is necessary to use a mixture of sugars in order to obtain such a product. If granulated sugar (sucrose) is used alone, unless exactly the right amount of inversion is obtained, the product will soon become very hard, because of the crystallization of the sucrose into coarse crystals. If dextrose (crystalline corn sugar) is employed without a high percentage of sucrose, a very large number of fine chalky crystals will form in the product and it will become hard. Even invert sugar has too high a percentage of dextrose to be used alone.

Blends of sucrose (granulated sugar) and corn sirup give the best products and consequently are ordinarily used. A good product can be obtained by the use of a sirup prepared by using 60 parts of sucrose and 40 parts of the c.s.u. grade of corn sirup; but a better product is obtained if enzyme-converted corn sirup is used in place of corn sirup. The best proportions for all-round use are 50 parts granulated sugar and 50 parts 43-deg. Bé. enzyme-converted corn sirup. On a dry-matter basis, this is approximately 55 parts granulated sugar and 45 parts enzyme-converted corn sirup. For some products, particularly those low in acid, 40 parts granulated sugar and 60 parts 43-deg. Bé. enzyme-converted corn sirup should be used. This corresponds to 45 percent sucrose and 55 percent enzyme-converted corn sirup solids on a dry-matter basis.

Properties of Enzyme-Converted Corn Syrup

The enzyme-converted corn sirup differs from the c.s.u. grade of corn sirup in that its dextrin content is much lower and its sugar content is much higher. For this reason the viscosity of enzyme-converted corn sirup is only about one-third that of ordinary corn sirup. Because of the high dextrin content of ordinary corn sirup, it should not be used in a proportion greater than about 40 percent of the total amount of sugars employed. If the proportion used exceeds this figure, the product will be rather gummy and may not have a desirable flavor. On a percentage basis, enzyme-converted corn sirup has only half as much dextrin as is contained in c.s.u., and consequently is not gummy, so that a larger proportion of it should be used in making glacé fruit.

The use of enzyme-converted corn sirup in the proportions indicated, in place of c.s.u., gives a product that is more tender, less gummy, of better flavor and with much greater shelf-life —one which remains soft and will not crystallize for many months. Enzyme-converted corn sirup, being less viscous than regular corn sirup, is much easier to handle in the plant. It penetrates the

*"Sweetose," an enzyme-converted corn sirup made by A. E. Staley Manufacturing Co., Decatur, Ill., was used in the laboratory and commercial tests on which this article is based.

fruit more rapidly than either ordinary corn sirup or sucrose. This is due to its greater osmotic pressure. (See Fig. 1.)

Preparation of Fruit

Fresh, canned, frozen or brined fruit may be used for the making of glacé fruit. Dehydrated or dried fruit is sometimes used but does not ordinarily give a particularly desirable product. The use of fresh fruit usually yields a product of the best flavor. However, the use of canned, frozen or brined fruit simplifies factory operations and makes unnecessary the storage of the finished product for any considerable period, for, if preserved fruit is used, the manufacturing operations can be carried out at the time the product is needed and not at the season when fresh fruit is available.

Fresh Fruit—Fresh fruit selected for glacé should be picked at the stage when it has developed its maximum color and size but has not yet become soft. Upon its arrival at the plant, it should be carefully sorted and all soft and defective fruit picked out. It should then be washed and prepared for processing. Apricots should be halved and pitted; peaches should be scalded, skins removed, halved and pitted. When in the proper form for glacé, the fruit should be boiled in water for a few minutes. Boiling inactivates the fruit enzymes so that discoloration due to oxidation, e.g., browning, is reduced to a minimum. Boiling also drives the air out of the fruit and makes it more easily permeated by the sirup. It is impossible to indicate the time required for the boiling operation as it will vary with the kind, variety and maturity of the fruit. However, the fruit should be boiled long enough so that, when test pieces are cooled in water, the flesh appears wet and translucent, and no white spots are apparent. The boiled fruit should be drained before it is placed in the first sirup. The cooking water should be discarded.

Brined Fruit—Zucca melon is often preserved in sulphur dioxide brine. The slabs of brined fruit are rinsed in fresh water and then passed through a dicing machine.

The diced melon should be rinsed with water and then boiled with water for 10 minutes to wash out the brine and sulphur dioxide. Two or three cookings with fresh water may be necessary to eliminate the SO_2. When nearly free from SO_2 the dice are dyed.

Canned Fruit—Canned fruits need no special preparation other than draining.

Frozen Fruit—Frozen fruit should be slowly thawed, then quickly heated just to the boiling point in water, drained and immersed in the first sirup. If the thawed fruit is allowed to stand around for any length of time prior to boiling, it will oxidize, darken and lose flavor.

Citrus Peels—Orange, lemon and grapefruit peels are prepared for candying by boiling in water for 15 minutes, then draining, and again covering with water and boiling for 15 minutes. This process is repeated a third time. Then the peel is allowed to cool and the interior is scraped to remove the rag. Orange peels are sometimes candied whole, but are usually sliced into strips.

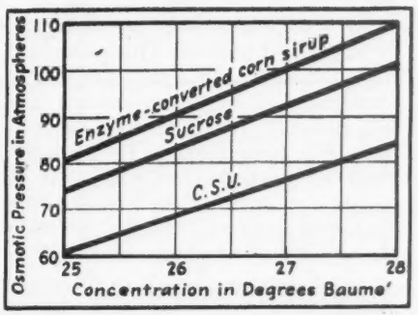


Fig. 1. Osmotic pressures of sucrose, enzyme-converted corn sirup and corn sirup (c.s.u. grade) at 30 deg. C. (From data furnished by the research laboratories of A. E. Staley Manufacturing Co., Decatur, Ill.)

Lemon and grapefruit peels are almost invariably sliced before candying.

Siruping the Fruit

Fresh fruits should be started in sirups containing 30 to 35 percent total solids, as determined by a refractometer. Most canned fruits can be started in a 50 percent sirup.

To prepare 100 gal. of 30 percent sirup containing equal proportions of granulated sugar and enzyme-converted corn sirup (on a moist basis), stir 154 lb. 10 oz. of granulated sugar into 75½ gal. of water, then stir in 154 lb. 10 oz. of enzyme-converted corn sirup.

To prepare 100 gal. of 50 percent sirup containing equal proportions of granulated sugar and enzyme-converted corn sirup (moist basis), warm 55½ gal. of water, then stir in 281 lb. of granulated sugar. When this is all dissolved stir in 281 lb. of 43-deg. Bé. enzyme-converted corn sirup.

To prepare 100 gal. of 30 percent sirup containing 40 parts of granulated sugar and 60 parts of enzyme-converted corn sirup (moist basis), 126.5 lb. of sugar, 189.8 lb. of enzyme-converted corn sirup and 75 gal. of water are required. For this amount of 50 percent sirup of this type, 230 lb. of sugar, 345 lb. of enzyme-converted corn sirup and 54 gal. of water are needed.

Open-pan Method

The simplest method of making glacé fruit is to heat the previously boiled fruit in the first (30 percent) sirup until it begins to boil, and then allow it to stand for 24 hours. At the end of that period the sirup is drawn off and boiled, preferably in a vacuum pan, until its concentration is raised approximately 10 percent higher than that of the original sirup, that is, to 40 percent.

The hot sirup is then poured back over the fruit, which is allowed to stand a day. Then the sirup is drawn off

Courtesy Mission Pack Co., Los Angeles

Hundreds of special packages of glacé fruits ready for delivery from the plant of Mission Pack Co., Los Angeles, Calif.

again and concentrated by boiling until it reaches 50 percent. This procedure is repeated again and again until the concentration of the sirup reaches nearly 80 percent. Then, after a period of standing long enough to permit the fruit to reach 75 to 78 percent total soluble solids, the fruit is rinsed in hot water, drained and dried. This system possesses the advantage that the sirup is practically all used up in siruping the fruit. But unfortunately, unless concentrating is carried out *in vacuo*, it does not give a good product, except in the case of citrus peel. In preparing citrus peel by this method, the concentration of the starting sirup is usually 50 percent total solids, or even higher, and if shredded peel is used it is often stepped up even faster than 10 percent per day.

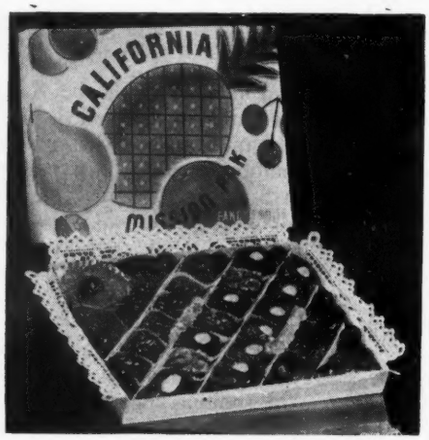
Vacuum-pan Method

For most fruits, concentration of the sirup by boiling under atmospheric pressure does not give a good product, because the repeated boiling darkens the sirup and causes the development of undesirable flavors which are imparted to the fruit. The procedure is, however, successfully used by effecting the concentration of the sirup in a vacuum pan instead of open pans. If the sirup is boiled down in a vacuum pan at a temperature of 180 deg. F. or lower, its color and flavor are not seriously affected, and consequently glacé fruit of high quality can be produced with a relatively small quantity of sugar and enzyme-converted corn sirup. Vacuum-pan concentration of sirups used in making glacé fruit is economical only if a relatively large quantity of one kind of fruit is treated in one or more large vats or kettles.

If a high grade of glacé fruit is to be produced in small pans, after the first treatment in sirup neither the fruit nor the sirup should be heated above about 180 deg. F. The sirup is drawn off each day at the beginning of the process, and every other day at the end of the process. If a vacuum concentrator is not available, it is heated in a pan to about 180 deg. and a sufficient quantity of a mixture of equal weights of granulated sugar and enzyme-converted corn sirup is added to raise the total solids content approximately 10 percent above the concentration attained the previous day. The sirup is stirred until the sugar has dissolved, then it is poured back over the fruit. This procedure is repeated until the sirup reaches a 70 percent concentration, then sufficient granulated sugar is added to bring it up to 80 percent total solids content and it is poured over the fruit, which is allowed to stand for a week or two, or at least long enough for the fruit and the sirup to reach the same sugar content.

Other Processes

In addition to these two processes, a number of other procedures are employed commercially. Some of the larger manufacturers have devised processes which effect the candying of the fruit at low temperatures. This makes possible the use of the sirup over and over again. Atkinson and Strachan[1] have devised dehydrators for candying fruit in shallow tanks placed on shelves. The temperature of the dehydrator is maintained at 140 to 160 deg. F. and heated air is circulated over the trays so as to bring about a slow continuous evaporation of the moisture of the sirup. As the sirup concentrates, more sirup of approximately the same strength is added. Such a system is advantageous where a large quantity of a given fruit is to be candied at one time, but is not so good where relatively small amounts of a number of different fruits are handled.



Courtesy Mission Pack Co., Los Angeles

Attractive assortment of fancy fruits packed by Mission Pack Co., Los Angeles, Calif. The assortment consists of large red cherries, glacé apricots, crystallized pineapple, candied tangerines, deluxe black and white figs, glacé grapefruit and orange and fresh California dates.

Use of Canned Fruit

Canned fruit, especially that canned with sirup, can be started in sirups of much higher concentrations than fresh fruits. Most canned fruits are more easily permeated by sugar and are less likely to shrivel. Canned pineapple, for example, may be started in a 50 percent sirup without objectionable results. Starting the fruit in concentrated sirup has the advantage not only of reducing the time required for candying, but also reducing the amount of sirup remaining after operations have been completed.

Candied Maraschino Cherries

Glacé Maraschino cherries are prepared in the same manner as other candied fruits, except that the sirup must be acidified to set the dye and prevent it from dissolving in the sirup. To do this, 4 oz. of citric acid is added to the sirup in which 100 lb. of fruit has been placed. Less citric acid, e.g. only one ounce per 100 lb. of fruit, is used on green cherries. If sirup containing citric acid is heated strongly, the sucrose will be largely inverted into dextrose and levulose. Therefore, it is important to use relatively low temperatures in siruping Maraschino cherries, so that only about half of the sucrose will be inverted. The pH of the finishing sirup should be 3.5 to 4.0.

Drying the Fruit

When the total solids content of the fruit has reached 75 to 78 percent, the sirup is drained off and the fruit dipped momentarily in hot water in order to wash off the excess of sirup. The fruit is then dried on corrosion-resistant screens or gratings. Drying is preferably carried out in circulating air which has been warmed to about 125 deg. F.

Lemon peel has a marked tendency to harden; therefore, it should be removed from the sirup when its soluble solids content reaches about 72 percent.

If fruit with a French glacé finish is desired, it is candied by one of the processes previously outlined. A sirup containing 50 parts of sucrose and 50 parts of 43-deg. Bé. enzyme-converted corn sirup by weight gives candied fruit of a quality suitable for French glacé. When the candied fruit reaches about 77 percent total solids content, it is withdrawn from the sirup, rinsed in hot water and dried for 24 hours or longer. Then it is dipped in a hot French glacé sirup which is prepared by heating to 238 deg. a sirup containing 7 parts of granulated sugar and 1 part of enzyme-converted corn sirup in 2 parts by weight of water. Another desirable French glacé sirup is prepared by heating 4 parts of sugar and 1 part of enzyme-converted corn sirup in 1 part of water to 238 deg. F. The sirup should be held at about 220 deg. F. while the fruit is being dipped. The dipped fruit is drained and dried in the same manner as ordinary candied fruit.

The higher the proportion of enzyme-converted corn sirup in the hot sirup the more transparent and glossy the glacé. However, if the proportion of enzyme-converted corn sirup used exceeds 20 percent, the glacé may be somewhat sticky in humid weather.

[1] *Fruit Products Journal*, Vol. 20, No. 6, 166-169, 185, 1941.

Why Do You Ruin Good Raw Material?

By VERA MEGOWEN
Vera Megowen Tea Room, Evanston, Ill.

Here is a challenge to food processors, addressed directly to poultry packers. A quantity buyer tells what she thinks about the malpractices of processors. She had no end of trouble getting a product of the quality that alert housewives expect. Her comments are worth considering

BY paying close attention to a multitude of details, I have built a restaurant business up to a volume that requires, among other things, over three carloads of dressed poultry a year. But to get the quality of poultry I want has been very difficult. Produce companies or packers have been inclined to smile indulgently at what they think are my whims, never realizing that I am not asking for anything unusual nor anything more than any experienced housewife demands for herself when dressing her own poultry.

In my fight to get exactly the sort of quality I demand the effort has caused some poultry packers to invite me to their establishments to see "how well" they do their jobs. What I have seen in the way of wrong methods has made such a profound impression that all the fancy stainless steel equipment and chromium plated trimmings, though beautiful and sanitary, are quickly forgotten. And when the management of such packing houses has had the effrontery to defend these wrong methods I have taken my business elsewhere!

In the days when I was superintendent of the catchup department of Marshall Canning Co., Marshalltown, Iowa, I learned the value of minute savings per bottle. Where the volume was large, to save one-tenth of a cent per bottle on a production of 500,000 cases meant $6,000 saved for the company. In a restaurant where patrons expect the best, the same forms of minute economies are the things that really count. Over the years I have proved repeatedly that when I can get the quality of poultry I want, I can serve and sell the cooked portions for a little over what they cost, making a big profit out of perfect livers. Admittedly, the unit profit is small, but my volume is large and the total net returns are adequate.

My real problem has been to locate sources of supplies where I could buy the type of poultry I wanted and to have that poultry dressed in a satisfactory manner. Nobody with a discriminating sense of taste enjoys the flavor of fecal matter from the intestines nor the flavor of bile from a ruptured gall bladder. Consequently, I will not patronize such establishments where owners permit such crude methods of poultry packing. Such are my so-called "whims."

Chicken is the most popular item with the American public. I serve about 450,000 people a year in my tea room in Evanston, Ill. In my 15 year's experience in restaurant business, my records show that chicken heads the preference list over all other meat orders. Almost one-half of my customers order chicken daily, which means we serve from 600 to 800, plus outside orders. Estimating roughly, we serve about 280,000 orders of chicken a year. I definitely believe in giving the public what they demand—so if it is chicken they want, it is up to me to serve them the finest quality and the most uniform portions.

More Uniformity Needed

I do not believe packers or poultry raisers have paid enough attention to the details necessary to achieve the most uniform bird. There is a big demand for the right kind of poultry, properly dressed, from all the better restaurants, clubs and hotels, and it follows that there is a very real and definite problem for poultry growers and packers to solve.

Feeding the public is like any other well-organized business. Success is

VERA MEGOWEN

achieved through a constant demand—serving the same number of people daily, the same number of people each meal, studying their wants, knowing these wants so that the law of averages will help you, together with intelligent methods of what to buy, and the amounts to cook.

Certainly we cannot give a constant quality, exactness in helpings of individual service, if we cannot secure a uniform product. Nor can we mix breeds of chicken—Leghorns, Buff Orpingtons, Rhode Island Reds or White Rocks—serving them as one wishes, fried, roasted or smothered. Mix these breeds when buying or cooking and the result is that chicken served to customers looks different because it is different. For instance, there is more meat on some breeds, as well as definite difference of flavor. Then, we ask, why does our business fail to achieve greater success and proper profits? Well-fed poultry (grain, then milk) has much more meat as well as larger livers. Serving those livers on my menus makes a tremendous profit for me.

In my search for poultry sources for my restaurant business, I visited every eviscerating plant within a 350-mile radius of Chicago. My order was for two carloads, which would be a cash on delivery transaction. Since the order would involve many thousand dollars, I was in dead earnest when I demanded the best and finest poultry available. Smaller young chickens are in their

People go to the Vera Megowen Tea Room to get good chicken, which the proprietor has had difficulty in buying from packers.

prime during the latter part of August and September, and it is the general practice throughout the country to kill, then put into storage at this time of year. I wanted my poultry to be cleaned or eviscerated at the time of killing. In my opinion, poultry with the viscera intact, frozen and kept for several months is not of as good a flavor as when the entrails, gall bladder, and so forth, have been removed. For as one starts to clean quality grain-fed chickens, the inside cavity has no disagreeable odor of fecal matter, and naturally the flavor is superior.

Amazing Carelessness

The interior of the eviscerating room in one plant I visited, I was told, cost over $30,000. There were government inspectors on duty, but even so the results made me heart-sick. The poultry was first attacked by an employee with a knife that was sharp but approximately 2 in. wide and very blunt at the end. Into the vent of the fowl she slashed, sometimes carelessly cutting the entrails. This amazed me, and I asked the manager why it was allowed, for with such a deadly knife thrust the fowl was ruined. Entrail taste once allowed on the meat is there forever!

Next the fowl traveled along that costly belt of Monel metal to other girls with game scissors, whose job it was to cut off the liver from the viscera. Carefully? Not particularly, for it seemed to me they were little conscious that they should not completely ruin the livers. In fact, the girls working in this department seldom seemed to try to keep the liver intact. Gall bladders were broken and livers cut in two or more pieces, and there were many bruisings. I would not pay one cent a hundred pounds for such produce. It is only fit for fertilizer, not for human consumption. The rest of the procedure was almost perfect, but after this first operation, all the washing, the fine cooling racks and careful packing was of no importance.

The manager assured me he could fill my week-end order for poultry, that he would watch the eviscerating and would guarantee complete satisfaction. I gave the order, and never did I have so many returned orders of chicken or so many complaints in any day's business. I was really ashamed to face my customers, knowing the poultry was not of fine quality. I actually threw away many portions—backs and second joints—of those chickens. I was very careful to report all this to the manager of that plant where I had placed the order. The livers were a complete loss and I had depended upon these for most of my profit. All in all, not only did I loose about $75 on that poultry order, but because of the throwouts I lost some of my prestige—that of satisfied customers, for they expect, always, the finest quality.

Did that poultry packer offer to make good? No! He called several times for more orders, but in the meantime I took another inspection trip of some 350 miles and at last located a packer who could and would guarantee to give me all White Rock poultry. This was just exactly what I wanted, for according to my records and tests, the meat yield of this particular breed is greater.

This plant was not finished in chromium or stainless steel, but it was well equipped. As I walked through I noticed a friendly, kindly attitude and relationship between the head men and all the workers. Almost all of them had been there for a long time. I feel we can always trust that kind of business management, where there is such a congenial relationship.

I cleaned several chickens to illustrate my ideas, telling them the livers must come out whole, that there should not be a trace of gall, that a comparatively thin, sharp knife should be used to cut into the vent. When the operation was finished, I wanted no entrail flavor whatever in a single chicken in the entire order. Every worker cooperated to the utmost. I gave a week's order and it arrived virtually faultless. And there was much more meat on these White Rocks.

My customers knew immediately that I was serving better chicken. In fact, during one week alone we served 600 additional orders. The public I have found, always responds quickly to quality, so my two carloads of poultry will not last six months.

My insistence on uniform poultry, carefully drawn and packed, may have seemed only a whim to some of the packers I visited, but to the packer to whom I gave my business it proved reasonable and convincing. Such insistence has been a boom to the business to both of us. During 1941 I increased my business to the extent of serving 34,567 more people than during the preceding year.

I believe the poultry industry should know about the needs of the restaurateur, standardization of breeds, proper feeding and correct handling all the way through the various operations of the eviscerating plant. For, by keeping up with the needs and demands of the public the industry can effectively increase its profits.

Trucks Best Trains On 1,500-Mile Run With Perishables

Get load there 24 to 48 hours quicker and at no additional cost. Haul is across eight states from Binghamton, N. Y., to Miami, Fla., dairy products being carried south and produce north. Mechanical refrigeration prevents deterioration in quality

ADEQUATE preparation — six months of it before even a wheel turned—is responsible for the success of one of the most remarkable food hauls in the United States, the 1,500-mile, one-way run of Crowley's, Inc., between Binghamton, N. Y., and Miami, Fla.

The run, now in operation for over three years with a fleet of White tractors and Fruehauf semi-trailers, is economically sound because it is based on the law of supply and demand. Food products are carried at approximately the same cost as rail rates but in from 24 to 48 hours less time than by railroad. In addition, the products carried remain in the custody of the Crowley company from the beginning to the end of the trip and are kept under positive mechanical refrigeration with thermostatic control and a temperature range of not over 3 deg. F. to prevent spoilage or deterioration of quality.

The economic necessity behind the inauguration of the run lies in the fact that the seasonal increase in the number of tourists in Florida from November to May makes it impractical for the dairy industry of Florida to produce sufficient dairy products to take care of its peak requirements.

Florida, Georgia and the Carolinas are not great dairying states and do not produce sufficient dairy products to take care of their own local requirements throughout the entire year. Therefore, the nearest points from which dairy products can be secured for shipment into Florida are the midwestern and northeastern dairying states, including upper New York State.

All the dairy products hauled on the Crowley run are perishable items consisting principally of heavy cream (whipping cream), light cream (coffee cream), fresh condensed milk, sour cream and soft cheeses of various kinds such as cottage cheese, baker's cheese, and so forth. No fluid milk is hauled because Florida is now producing sufficient milk to take care of all its bottled-milk requirements.

The answer to the question of how it is economically possible to sell cream in Miami, after having hauled it 1,500 miles over the road, lies in the law of supply and demand. However, the cost of hauling a can of cream by tractor and trailer from Binghamton to Florida is no greater than by railroad, and the cost is approximately 10 percent of the ultimate selling price.

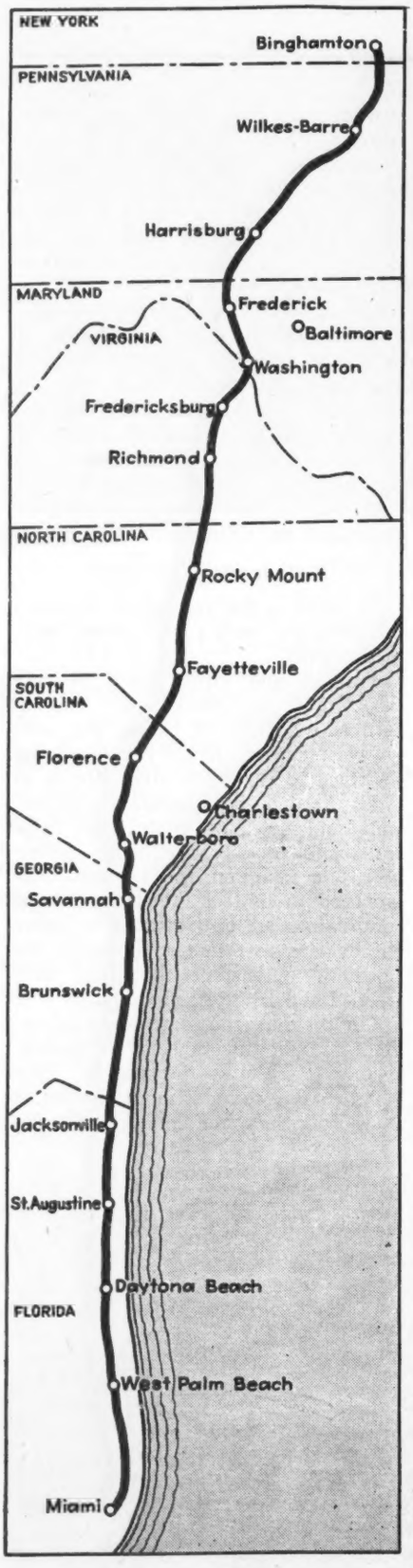
Back-loads Cut Costs

Included in the net cost of the run's operation are credits for hauling back-loads north.

Produce and citrus fruits of various kinds are hauled on the return trips instead of having the units go back empty. These back-loads are delivered to various produce dealers in cities located in Maryland, Pennsylvania and New York State. Since these fruits and produce are highly perishable, the same refrigerating means as are used to protect the cream carried southbound are also utilized to assure the delivery in prime condition at the northern outlets of the more fully ripened and later-picked fruits.

On the run, the same route is covered in both directions. It is approximately 1,500 miles one way or 3,000 miles for the round trip. Beginning in New York State and ending in Florida,

Line-up of part of the White tractor and Fruehauf all-aluminum trailer fleet making the Crowley 1,500-mile one-way run with fresh cream between Binghamton, N. Y., and Miami, Fla., one of the longest dairy hauls in the United States. Adequate preparation assured the success of the run, which is made on a time-table schedule and in from 24 to 48 hours less than train time.



Approximately 1,500 miles each way, the Crowley cream run crosses eight states. Return loads of produce and citrus fruits are carried on the northbound trips and delivered to dealers in Maryland, Pennsylvania and New York.

Close-up of one of the standard Crowley White-Fruehauf tractor-trailer units employed on the Binghamton, N. Y., to Miami, Fla., run. Through the use of the sleeper cab shown, two drivers make the complete 3,000-mile round trip in five days. The elapsed time is 50 hours in each direction, with a 20-hour layover in Miami. Of the 50 hours, 42 hours is driving time, with 8 hours for stops for meals and refueling. This gives an average running speed of 35.7 miles per hour.

the route traverses eight states in all, crossing southbound, in order, these six states: Pennsylvania, Maryland, Virginia, North Carolina, South Carolina and Georgia, as shown in greater detail in the accompanying map.

Preparations Took Six Months

Once the decision to start the run was reached, the six months' preparation previously referred to as being responsible for the success of the operation was begun. Nothing was left to chance. The preparation consisted roughly of two kinds of work, (1) the design, construction and selection of the automotive equipment to be used and (2) all the details of its operation over the highways. In addition, the preparation included the setting up of a regular roundhouse type of maintenance system by means of which the tractor-trailer units are operated on a schedule as rigorous as the railroad timetables on which passenger trains are run.

Actual surveys were made by riding over the possible routes which could be traversed. And records were made of the mileages between given points, the kind and width of road surfaces, the road grades encountered, the locations at which gasoline replenishments could be made and the points at which emergency road service, in case of accidents or breakdowns, was available.

Finally the route shown in the accompanying map was chosen as the most desirable from all viewpoints. In greater detail than it is possible to show in the accompanying map, the route goes from Binghamton, N. Y., via Route 11 to Nicholson, Pa., follows Route 92 to Tuckhannock and Wilkes-Barre, Pa., Route 11 to Harrisburg, Pa., goes through Northumberland on Route 15 to Frederick, Md., then takes Route 240 to Washington, D. C., Route 1 to Petersburg, Va., Route 301 to Fayetteville, N. C., Route 15 to Walterboro, S. C., U. S. Route 17 through Savannah, Ga., to Jacksonville, Fla., and finally U. S. Route 1 to Miami.

The route crosses the North and Stony mountains in Pennsylvania, passes through the foothills of the Cumberland Mountains in Maryland and thence goes through the rolling hills of Virginia and North and South Carolina into the tidal plain of Georgia at Savannah and into Florida. The maximum road grade which has to be negotiated on the run is 8 percent, over the mountains in the neighborhood of Tuckhannock, Pa.

With the route decided upon, the next preparatory work was the selection of the tractor and semi-trailer equipment to give adequate performance on the route, including the desired running time and net payload. In the tractor, proper engine size or cubic inch piston displacement, correct rear axle gear ratios, proper tire sizes and as large brakes as it was possible to secure on both the tractor and the trailer were all important factors.

Total gross weight of tractor, semi-trailer and payload allowable under the

highway motor-vehicle laws of the eight states traversed on the run was an important restriction which had to be met in the unit finally selected. The gross loaded weight had to be adjusted so as not to exceed the minimum gross-weight allowance of all eight states.

Equipment Selected

The tractor finally selected as standard equipment for the run was a White Model 810S cab-over-engine chassis of 133-in. wheelbase with a 362-cu. in. engine, dual rear axle ratios of 5.623 to 1 and 7.65 to 1, 10:00x22 tires all around, 720 sq. in. braking area on tractor and trailer, air brakes and a sleeper cab. The cab-over-engine tractor chassis was selected because of its shorter over-all length to give the longest length semi-trailer body to come within the minimum over-all length of tractor and trailer as permitted by the laws of the eight states.

The minimum gross loaded vehicle weight was 39,000 lb. in the State of Pennsylvania. To carry a net payload of 10 tons, a Fruehauf all-aluminum trailer was selected as standard equipment. This trailer has an aluminum body and an aluminum-alloy frame. It weighs approximately 3,500 lb. less than a conventional trailer of the same size and thus permits a like increase in the payload.

The trailer bodies are fully insulated and are cooled by means of mechanical refrigeration consisting of a Century Electric Co. 110-volt generator driven off the tractor gear-set and a 2-hp. York compressor, cooling tubes and an air-circulating fan located in the nose of the trailer and shown in detail in two accompanying illustrations.

Thermostats, as well as a 7-day recording thermometer, are included as part of the refrigeration equipment. Inside body temperatures within a range of 3 deg., from 32 to 35 deg. F., are maintained automatically en route through the thermostatic controls.

In operation, the total number of trips made a week to Miami fluctuates on account of the law of supply and demand. However, each trip is made on a rigid timetable with predetermined operating speeds in accordance with road and traffic conditions, whether over mountainous or level roads and whether the territory is covered by day or night driving. Certain stops are made for fuel.

Drivers Report En Route

Each tractor driver is required to report by wire to his terminal from three different specified points along the route on each of the north and southbound trips. This reporting system enables the fleet supervisor to check all the tractor units on the road with their respective timetables and if necessary, to contact the drivers en route.

To reduce the time of any road delays, each driver is supplied with complete instructions as to where service may be obtained en route on the tractor, trailer, refrigerating unit, tires, and so forth, as well as the locations of the nearest offices of the company's insurance carrier.

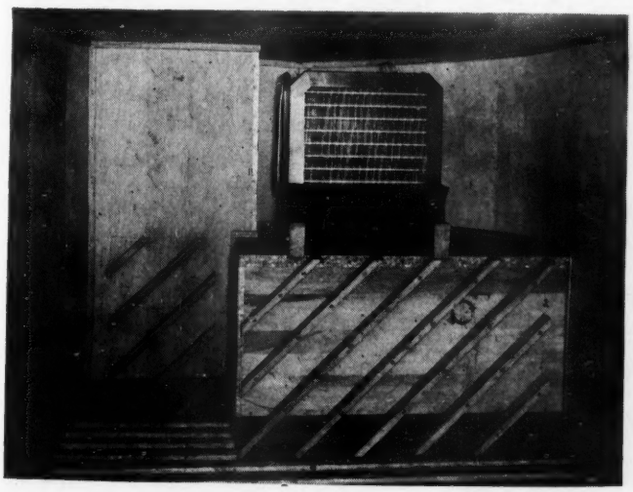
The run is operated by the Crowley company as a private carrier and conforms with all ICC safety and driving regulations. The latter require that no driver may drive continuously for more than 10 hours without a rest period of 8 consecutive hours. This in turn requires two drivers on the Miami run, one of them driving his spell while the other sleeps in the tractor's sleeper cab.

The two drivers make the complete 3,000-mile round trip in 5 days, or 120 hours. The elapsed time in each direction is 50 hours, made up of 42 hours of actual driving and 8 hours for stops for meals and refuel. Requiring 42 hours to cover approximately 1,500 miles gives an average running speed of 35.7 miles per hour.

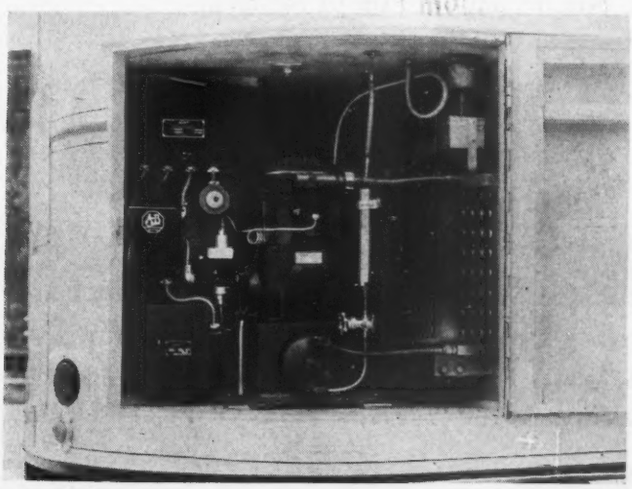
On arrival at Miami, which is usually in the late afternoon, the tractor unit lays over for 20 hours and the drivers are relieved from duty and furnished comfortable household sleeping quarters for the night. Meanwhile, the entire tractor, trailer and refrigerating equipment are completely checked and serviced and made ready for the start of the north-bound trip on the following day.

At Binghamton, the company maintains complete garage and shop facilities. Each unit is thoroughly serviced and checked from bumper to bumper at this northern terminus after the completion of each round trip. The drivers have 48 hours off in Binghamton before starting on their next southbound trip.

The selection and pairing of drivers whose personalities do not clash is of great importance in the success of the run. The company endeavors to employ only drivers who have had not less than 100,000 miles of no-accident tractor-trailer operation. They must be in excellent physical condition and before employment must submit to a complete physical examination which includes a Wasserman test. Thereafter physical check-ups are made every six months at company expense.

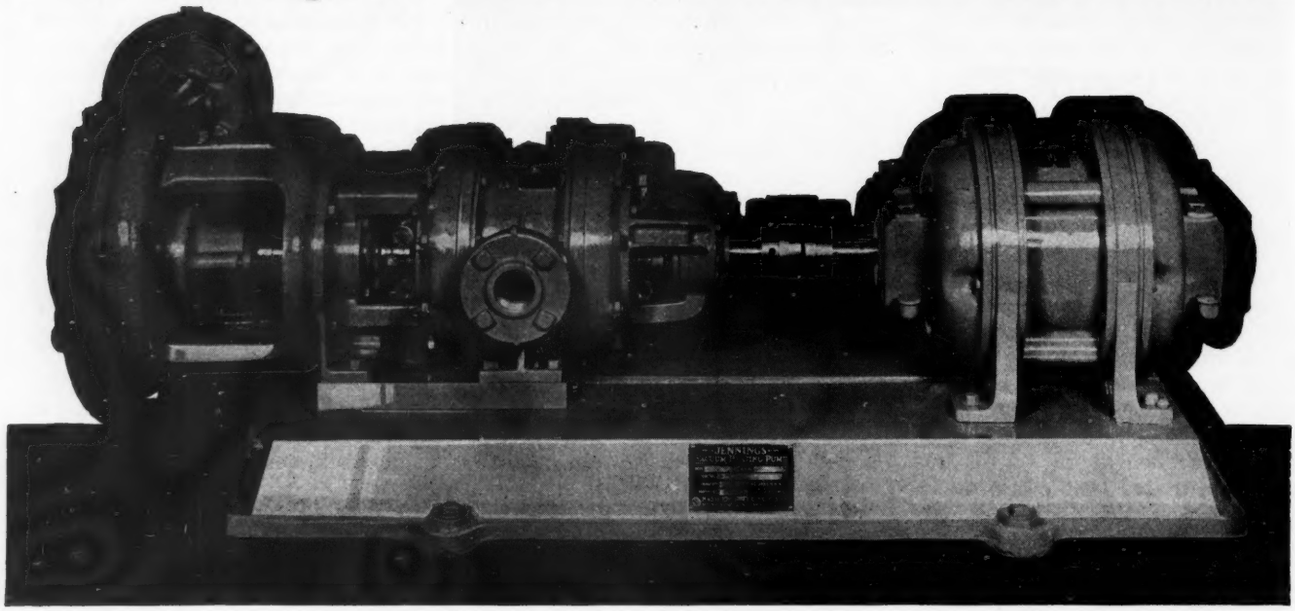


Looking toward the front end of the Freuhauf all-aluminum trailer showing the cooling refrigerating coils with an air-circulating fan in the rear. On the Miami run, the interior body temperature is kept between 32 and 35 deg. F.



Opening the hatch door in the nose of the Crowley trailer reveals the 2-hp. York compressor and other parts of the refrigerating system which protects the cream carried on the southbound run and the produce and citrus fruits delivered on the northbound trip.

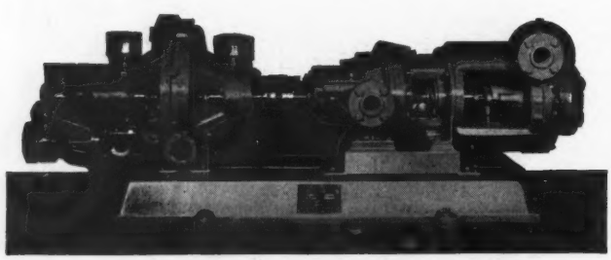
Nash—the Perfected Vacuum Pump for Evaporators and Condensers



COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.

NASH ENGINEERING COMPANY

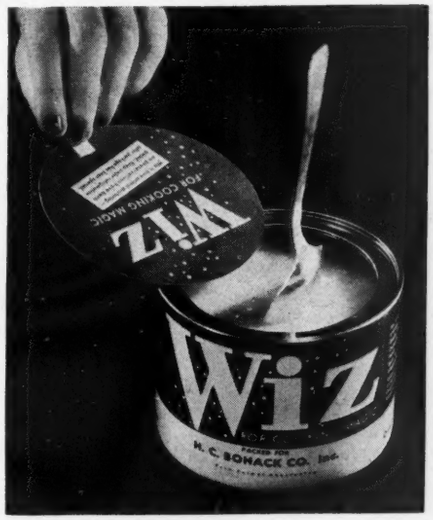
SOUTH NORWALK · CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

New Type of Container

A CONTAINER in which lard can be packed and displayed without refrigeration has been adopted by H. C. Bohack Co., Inc., Brooklyn, N. Y.

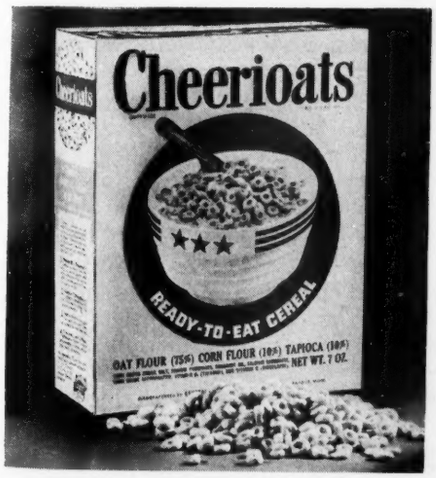
Made of chipboard laminated on the interior with Cellophane and on the exterior with printed Cellophane, the container uses metal only in the rim which holds the lid. For display purposes, a sheet of transparent cellulose film is placed in the top of the package, held in position by the metal rim that crimps over the container walls. A cardboard lid fits into the rim over the cellulose.



Puffed Oat-flour Cereal

OAT FLOUR, corn flour and tapioca form the basis of "Cheerioats," new breakfast food marketed nationally by General Mills, Inc., Minneapolis, Minn. Other ingredients are sugar, salt, sodium phosphate, coconut oil, calcium carbonate, iron oxide saccharated, vitamin B_1 and vitamin G.

As the cereal contains 75 percent oat flour, it is an acceptable substitute for



oatmeal in ready-to-eat form. The doughnut-shaped, puffed Cheerioats are packed in a yellow and blue carton with a net weight of 7 oz.

Brings Out Food Flavors

SEEMAN BROS., INC., New York, has begun an extensive advertising campaign to introduce its new "Pique" product, "Kitchen Magic." The concentrated seasoning is said to bring out natural food flavors when added to vegetables, meat dishes, soups, salad dressings and stews. Kitchen Magic can also be served as a meat-free bouillon.

Ingredients are vegetable-protein derivative, water, salt, yeast vegetable extractive, spices and vegetable fat. The company feels that Kitchen Magic will meet with favorable response at a time when American housewives are trying to make food supplies go as far as possible, since the seasoning adds new interest to left-over dishes.

Time-Saving Carton

A FOLDING carton that can be opened with a flick of the hand is now being used by Messing Bakeries, Brooklyn, N. Y., for its line of cakes and pastries.

The box, manufactured by Robert Gair Co., Inc., effects a saving in material as well as in labor and storage space. Both bottom and cover can be set up quickly at the packing tables.

Canapé Spread

"ROSE MILL PÂTÉ," a new liver paste, is the latest delicacy food. Prepared by Stahl-Meyer, Inc., for Planned Foods, Inc., of New York, the product is advertised as a spread for sandwiches, hors d'oeuvres or canapés.

The pâté contains whole fresh milk, chopped whole fresh pork livers, pork fat, wheat germ, dry skim milk, fresh onions, soya meal, fine-cut oat meal, dried yeast, salt and spices and hydrolyzed plant protein (artificial flavoring). For quick suppers, Rose Mill Pâté can be sliced and served with salad, or sliced and sautéd in butter to be served with eggs or baked beans.

CONTRAST IN NUTRITION

Feeding 200,000,000 people engaged in total war presents a mighty problem. They cannot be herded on some choice mountain pasture and left to feed off nature's table. Food must be transported to them, at home and in distant lands, over facilities sorely taxed by rubber shortages, ship sinkings, and movements of military forces and equipment. To do this and at the same time safeguard against the vitamin deficiencies encountered even before the war, each cubic foot of space must carry new high vitamin values. The quickest, most direct and cheapest way to accomplish this is through addition of pure vitamin substances like thiamine (vitamin B_1), niacin and ascorbic acid (vitamin C). A single ounce of thiamine, for instance, represents the full daily vitamin B_1 requirement of 15,750 active adults! Our company manufactures synthetic vitamins actually by the tons and stands ready to help your own research department solve the nutritional problems looming ahead on the horizon.

VITAMIN DIVISION

HOFFMANN-LA ROCHE, INC. • ROCHE PARK • NUTLEY • N. J.

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • JUNE, 1942

Food Committee Announced At AGMA Convention

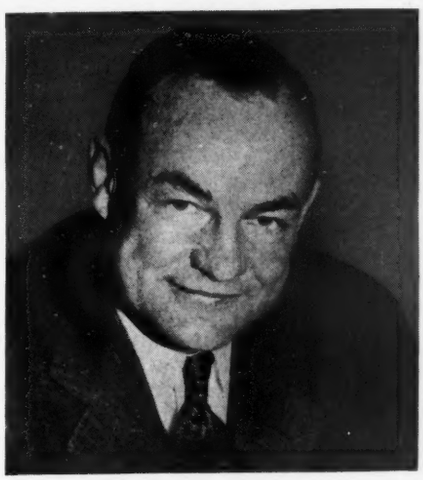
Coordinating food agency probably will be headed by Wickard. Wartime food problems discussed

WHAT the food industry has long been waiting for, the formation of a War Food Requirements Committee, was announced as a highlight of the annual meeting of Associated Grocery Manufacturers of America, in New York, May 21-22. Secretary of Agriculture Claude R. Wickard was named as the "probable" head of this committee, which will operate under the direction of the War Production Board. (See page 35 for a discussion of the significance of this development.)

Secretary Wickard was present at the convention and spoke on the food situation in this country. He indicated that there would be some shortages but that there will be no impairment of the nutritional standard of the American diet. Shortages of fertilizer, farm machinery, agricultural labor, trucks and tires, tin and processing equipment and an overburdened transportation system were listed as problems affecting the food producing and distributing industries.

Food manufacturers who think they will have to convert to war production were urged to start now by Rush Watkins, chief, conversion section, food branch, WPB. These manufacturers were advised to appoint one or two first-class men to devote full time to digging up war business, working in cooperation with the conversion facilities of the WPB conversion section. The initiative in conversion musts come from the manufacturers, Mr. Watkins said. As an example of food plant conversion he cited a chocolate sirup manufacturer who is making shell parts.

Standard specifications for food and beverage containers are being worked out by the container branch of WPB, it was reported by C. L. Sheldon, deputy chief of the branch. Such specifications have just been released for malt beverage bottles. Mr. Sheldon stated that packagers must eliminate all metal and rubber, reduce the expenditure of labor and power and get along without new machinery. His branch is now working on a census of idle packaging machinery. He ended with the statement that there will continue to be adequate packages, even if they are not as good in all ways, and the food industry will not have to go back to the "cracker-barrel" era of packaging.



CLAUDE R. WICKARD

Paul S. Willis, president of AGMA, urged food manufacturers to do their part in the war effort and to comply with all government regulations even if they consider them wrong—in which case they should constructively protest.

Mr. Willis stated that some in the industry were not aware of the threat to brand names. Certain quarters are pushing for a general "Victory" brand to replace advertised brands, he said. Advertising is also "on the pan," particularly so now that price ceilings have been set.

Reserved Canned Food Will All Be Bought

THE Army Quartermaster will buy all those canned goods which canners are required to set aside for the government out of this year's pack. Whenever a canner has completed any part of his pack, a QMC officer will negotiate directly for the government's portion. Inspection will be made at the cannery by employes of the Agricultural Marketing Administration and the cases for government account earmarked. Finally, QMC officers from Jersey City, Chicago or San Francisco complete the deal by arranging for shipment.

Purchases will be made in this manner not only for the Army, but also for the Navy, Marines, Veterans' Administration, Lease-Lend and Treasury.

Label Change Permitted

TO PERMIT a reduction in the use of sugar, W. G. Campbell, of the Food and Drug Administration, has ruled that canners need not indicate on the labels of standardized fruits of this year's pack the weight of the sirup in which the fruit is packed.

New Price Plans Set For Canned Vegetables

SPECIFIC price regulation covering canned vegetables at the canner's level was decided upon late last month by OPA and the Department of Agriculture, as was also a price-support program for canned vegetables.

The price formula decided upon is as follows (1) The weighted average price charged by the canner for certain sales of each grade and container size made by him during the first 60 days after beginning the 1941 pack. (2) To which shall be added 8 percent to compensate for necessary increases in cost occurred in putting up the 1942 pack, exclusive of raw material costs. (3) To this may be added the actual increases in the cost of raw materials for the 1942 pack. However, such increases shall not exceed the advances in the cost of raw materials as of May 4, 1942.

The canned vegetables to be affected by the Department of Agriculture's price-support program, which is to assure production sufficient to meet the needs, will include asparagus, lima beans, snap beans, beets, sweet corn, carrots, peas, spinach, pumpkin, squash, tomatoes and tomato juice.

The price support plan guarantees to canners of these products prices at 92 percent of the canner's individual gross ceiling prices. The price guarantees are limited to U. S. Grades A, B and C.

STOP THOSE WORMS!

EVERY food manufacturer who uses or stores nuts knows that worms can get in unless something is done to stop them. Once started, they cause destruction and wasteful contamination.

Worms and other pests can be controlled by thorough fumigation with an effective fumigant such as HCN gas, properly applied. Plant fumigation should be part of a well planned campaign—to be carried out only by trained, experienced men.

Many food processors have found that control problems are ably handled by established Pest Control Operators operating in their locality. These operators are equipped to give prompt and specialized service on practically any type of mill fumigation.

If you have your own fumigation crew, we have a useful book about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. No obligation, of course.

DU PONT

E. I. DU PONT DE NEMOURS & CO.
INCORPORATED
ELECTROCHEMICALS DEPARTMENT
WILMINGTON • DELAWARE

CYANEGG
AN ECONOMICAL SOURCE OF HCN FUMIGATING GAS

Cereal Chemists Meet in Chicago

Convention speakers discuss sugar substitutes, enrichment, and problems of nutrition

MORE than 400 attended the 28th annual meeting of the American Association of Cereal Chemists at Chicago, May 18-21. At this meeting, W. H. Geller, vice-president of the American Society of Bakery Engineers, called for better understanding and closer cooperation between chemists and production men in order to find better ways to produce improved cereal products. He offered suggestions for a more practical interpretation of flour analysis based on actual baking performance under standard conditions.

Among the many technical papers presented, one by Jan Micka, United Biscuit Co., Chicago, deserves special attention in view of the sugar rationing program. A study of sugar requirements for cookie doughs revealed that wire-cut or drop machines increase sugar requirements in comparison with cutting and rotary machines. Also, low-protein soft winter wheat flours require less sugar. Dextrose sugars can replace cane and beet sugar to some extent in any type of dough. Cocoa powder and cocoanut increase the sugar in doughs, whereas glucose, baking soda and ammonia decrease it.

A comparison of the B-complex factors in malted and unmalted barley and wheat, presented by C. F. Davis, Schwarz Laboratories, New York, yielded the surprising result that the riboflavin content increases appreciably during malting, while thiamin, macin and pantothenic acid remain practically the same.

The nutritional aspects of flour and bread supplements were discussed at a symposium presided over by F. L. Gunderson, secretary of the Food and Nutrition Board. R. R. Williams, Bell Telephone Laboratories, reviewed the progress of the enrichment program. Some 60 to 70 percent of all white bread, and slightly less of all family (white) flour purchased today, is enriched, assuring an immediate economical and universal improvement in the nutritional value of a stable food.

Newly elected officers are: J. M. Doty, president; Dr. Betty Sullivan, vice-president; H. G. Obermeyer, secretary; P. Rumold, treasurer; M. J. Blish, editor, and R. M. Sandstedt, managing editor, of *Cereal Chemistry*.

Pork Price Ceiling Made Permanent

PERMANENT price ceilings, at the wholesale level, were announced on May 21 by OPA for ham, bacon and other pork products. This replaces the temporary price ceiling which expired on May 22.

FOOD PLANT WINS MINUTE MAN FLAG

Because of the outstanding record made by employees in the purchase of U. S. Savings Bonds, the Oklahoma City plant of Armour & Co. has been awarded the Minute Man pennant by H. C. Jones, State Administrator of the Oklahoma Division of the Defense Saving Staff. Joe Sales, left, a calf skinner, pledged 19 percent of his earnings and Vesta Morgan, center, of the casings department, 32 percent. Mr. Jones is at extreme right.

Food Research Grants Made

Nutrition Foundation awards grants of $125,000 for study of nutrition problems

GRANTS of 125,000 for fundamental research in the science of nutrition were announced on May 20 by Dr. Karl T. Compton, chairman, Nutrition Foundation. And George A. Sloan, president of the Foundation, announced the election of National Dairy Products Corp. as a foundation member, and the election of their president, L. A. Van Bomel, a member of the board of trustees. Dr. Lloyd K. Riggs, of National Dairy, and J. T. Knowles, in charge of the Chicago laboratory of Libby, McNeill and Libby, were appointed to the advisory committee.

Dr. Compton said the Board had considered a large group of applications with reference to three primary objectives, which the Board wishes particularly to support under present conditions: First, their contribution to our war effort. Second, their immediate advantage to public health. Third, their long-time advancement of the fundamental science of nutrition.

Among the institutions receiving Foundation research grants were:

Columbia University, Yale University, Ontario Agricultural College, Cornell University Medical College, University of Pittsburgh, University of Illinois, University of Wisconsin, Stanford University, Johns Hopkins School of Medicine, Alabama Polytechnic Institute, Duke University School of Medicine, Purdue University, Oregon State College, University of Minnesota, University of Chicago, University of California, University of Rochester, Fordham University, University of Cincinnati, Northwestern University Medical School, Wayne University College of Medicine, Emory University, Children's Fund of Michigan, Food and Nutrition Board of the National Research Council, and New York State Agricultural Experiment Station.

Illustrative of the research projects for which grants were made are these:

Nutrition in relation to fatigue. Effects of environment on nutritional requirements. Influence of nutritional factors on the healing of bone fractures. A natural butter of high nutritional value and high melting point suitable for use in the tropics. Optimum conditions for the conservation of vitamins in dehydrated foods.

Helps Food Companies Locate Used Machines

THE IDEA of "pooling" available food plant equipment advocated by FOOD INDUSTRIES (March, page 70) is being worked out in effect by one equipment maker, Package Machine Co., Springfield, Mass. Companies which cannot obtain new packaging machines are being put in touch with other manufacturers who have idle machines.

Do you need a WRAPPING MACHINE quickly?

We'll help you locate one

War work and the recent W.P.B. freezing order L-83, prevent us from promising early delivery of wrapping machines, except to those who have the highest priorities.

We may, however, be able to put you in touch with a package goods manufacturer willing to sell you an idle machine that will meet your needs. And we will be glad to help with parts to alter the machine, if desired.

Our broad and intimate knowledge of the industry has enabled us to do this successfully for others. So if you need a machine quickly, perhaps we can be of service to you, too.

We will not buy or sell any of these machines. Our aim is merely to be of assistance to package goods manufacturers for whom we cannot build new machines at the present time.

Write us today, stating the type of wrapping machine or style of wrapping in which you are interested. We'll get to work at once.

PACKAGE MACHINERY COMPANY
Springfield, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Pointers on Dehydration Given at Conference

Army wants 25 million pounds of vegetables. Better dehydration practices discussed by technologists

MUCH important information on dehydration was given out at the Dehydration Conference, held at the University of California, May 1-2.

A letter read from Lieut. Col. Paul P. Logan, Office of the Quartermaster General, stated that in 1942 the Army and Navy will need 25,000,000 lb. of dried vegetables. Most of this tonnage is contracted for or covered by letters of intent. The vegetables needed in greatest amounts are potatoes, sweet potatoes, carrots, onions, cabbage, rutabaga, turnips and beets. Some soup vegetables and other products may be taken later.

Dr. J. E. Knott, of the College of Agriculture, stressed the importance of arranging right now for growing crops to be dehydrated. On some crops it is almost too late to make such arrangements in California. It is necessary to choose proper varieties, grown in suitable localities and to process promptly after harvest. Netted Burbank (or Netted Gem) potatoes and Ebenezer and other pungent varieties of onions are preferred for drying.

W. B. Van Arsdel, of the Western Regional Laboratory, dealt with the basic principles of dehydrator design, and concluded that a central air discharge tunnel dehydrator with ample air heating and fan capacity is best in the light of our present knowledge. This system gives very rapid drying when the product is wet, and provides dry, hot air at the finishing end of the tunnel.

C. H. Beasley, of the Agricultural Marketing Service, emphasized the need for better raw materials and much greater attention to care and cleanliness in the plant. Unless operators pay more attention to quality, "things may happen." He and his assistants, Messrs. Kuneman and Smith, bore down on the need for coding each and every lot, or each shift's output, of dried product. A whole month's output may be condemned because of the impossibility of locating a day's pack that is below standard.

The effect of various factors on the vitamin content of fruits and vegetables was discussed. Dr. Agnes Fay Morgan, of the Department of Home Economics of the University, reported that blanching preserves vitamins C and A. Sulphurous acid used in bleaching retains C but destroys B_1, which is all right for fruits, as they usually contain much C and little B_1, but the reverse is often true for vegetables. G. Mackinney, of the College of Agriculture, showed that blanching carrots tends to protect against excessive loss of vitamin A in storage after drying. Harry von Loesecke, of the Winterhaven Laboratory of the Bureau of Chemical and Agricultural Engineering, favors steam blanching and opposes the British method of blanching in water in which the solids content approaches that of the product.

Dr. H. Lineweaver, of the Western Regional Laboratory, pointed out that enzymes may greatly damage the quality of dried products. Dr. M. A. Joslyn, of the College of Agriculture, demonstrated tests for the catalase enzyme with hydrogen peroxide, and for peroxidase with guaiacol and hydrogen peroxide. He finds guaiacol much more dependable than benzidine, as the latter often is catalyzed by inorganic substances such as iron and copper salts. Guaiacol plus hydrogen peroxide gives a reddish coloration if peroxidase is present.

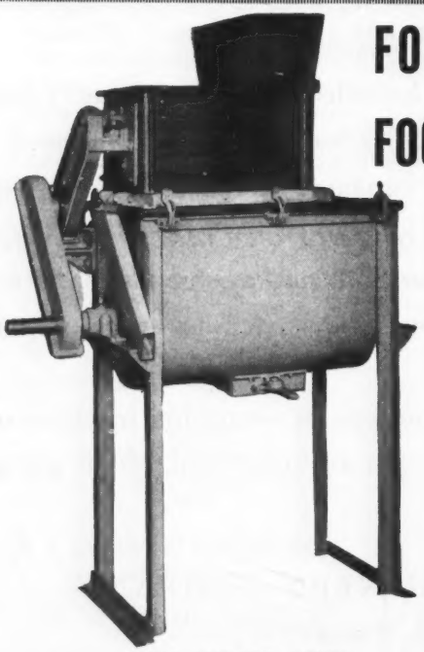
Professor E. O. Essig, of the College of Agriculture, listed the Indian Meal Moth, the Mediterranean Meal Moth, the Saw Toothed Grain Beetle and the Dried Fruit Beetle as those which may infest and spoil dehydrated foods.

Fumigation Advised

Paul Richert, of Neil and MacLean Chemical Co., San Francisco and Fresno, Calif., reviewed the properties of various fumigants used to control and eliminate insects in stored foods, and concluded that methyl bromide is about the best. If dehydrated vegetables or dried fruits are to be stored in bulk they should be fumigated regularly, at least once a month, until packaged and shipped. Tight storage rooms are necessary for this purpose. The food may also be fumigated as it is packed.

Dr. E. M. Mark, of the College of Agriculture, covered dehydration of canning fruits, such as berries, cherries, peaches, apricots and pears. In most cases dehydration gives products of better cooking quality, although not necessarily of better appearance, than sun drying.

L. R. Leinbach of the Western



FOOD DID IT BEFORE,
AND
FOOD WILL DO IT AGAIN!

To paraphrase a currently popular song into a very evident and grim reality: *food will win the war!*

Food processing and preservation is as essential to the Nation as the armament program. The processes of food preservation must be fast, economical and safe; and *without waste.*

The food industries are called upon to accomplish this objective: technical knowledge and expert skills, they have. The necessary equipment available is a matter of conjecture.

As manufacturers of processing equipment, we are prepared with tools, machines and trained personnel. Our Sales and Engineering Departments will assist you in planning plant equipment and lay-out for Cutting, Grinding, Pulverizing, Sifting, Blending, Mixing and Material Handling Operations.

Write to us regarding your equipment requirements, your inquiry will be given the prompt and careful attention.

THE MIDGET MIXER
This Mixer is equipped with a wood body Brush Sifter mounted above the mixing chamber. All steel welded body and frame, center discharge gate and slotted ends for convenient removal of mixing element for cleaning. Furnished in four sizes with capacities from 1 to 5½ cu. ft. per charge.

ROBINSON MFG. COMPANY
71 Painter Street **Muncy, Pa.**

Regional Laboratory reviewed various methods of determining moisture in dried vegetables and recommended toluene distillation for general factory control. C. D. Fisher, of the Dried Fruit Association Laboratory of Fresno, Calif., called attention to the rapid electrical conductivity moisture tester developed by himself a number of years ago. With it one can make a moisture determination in less than 5 minutes. Owing to the great difference in conductivity of fruits and vegetables, the dried fruit moisture tester is not suitable for vegetables. He has built a machine for vegetables and hopes that it will prove successful.

Food Processors May Hire Girls Under 18

GIRLS under 18 may now be employed in food processing industries which are filling government orders, according to an exemption to the Walsh-Healey Act requested by Secretary of War Stimson. Under the exemption, which will serve public interest in the present crisis, no girl under 16 may be employed, and no girl under 18 may be employed for more than 8 hours a day at less than minimum hourly rates of pay. Management can in some cases hire girl workers on both government and private contracts.

Two Grade Standards

FINAL U. S. Standards for grades of canned peas, effective May 1, and Tentative U. S. Standards for grades of dried peaches, effective June 1, were released by the Agricultural Marketing Administration. The standards will serve as a basis of sale in wholesale transactions and for determining loan values on hypothecated stocks.

HEADS SOUTHERN BAKERS

Lee Hilton, Sr., Charlotte (N. C.) Bread Co., was elected president of Southern Bakers Association at the "United for Victory" convention held at Atlanta, May 3-6.

KEEP WAR PRODUCTION
ROLLING!
Move More Material
FASTER
WITH
STANDARD CONVEYORS
Planned and installed to meet handling needs in your plant, Standard power driven or gravity operated conveyors assure smooth, uninterrupted service 24 hours daily, a full seven days per week—keep materials and parts flowing—fast and sure—from machine to machine—department to department—help maintain the swift tempo of wartime production.
BOOKLET SHOWS WHAT STANDARD CONVEYORS CAN DO
Fully illustrated—the booklet, "Conveyors by Standard," is a "mine of information" on conveying methods with power and gravity conveyors—contains 76 pages of data—representative installations in all types of industries—a useful reference book for production executives. Write for your copy of Bulletin FI-6—"Conveyors by Standard."
STANDARD CONVEYOR COMPANY
General Offices:
NORTH ST. PAUL, MINN.
Sales and Service in All Principal Cities
"THE STANDARD OF VALUE"
Standard CONVEYORS
FIRST FOR FASTER PRODUCTION

HACKNEY SEAMLESS

BARRELS CLEAN

AND EASY TO KEEP THAT WAY!

TODAY'S pressure on production demands equipment that will comply with speed-up requirements. Every minute becomes doubly valuable. Hackney Removable Head Bilged Barrels are helping many shippers because they are easier and faster to clean.

The curvature of the chime in the Hackney container is exceptionally smooth. There are no crevices, seams or welded joints in the interior of the barrel. The Toggle-tite (or single bolt) closure securely holds the head air tight to the top edge, preventing leakage or the entrance of foreign matter. Easy handling is facilitated by the bilged shape of the Hackney container. Hard knocks, transportation abuse are easily withstood by its strong, durable construction.

These and many other advantages have served the food industry for years and have won widespread preference for Hackney Containers. They are the result of years of experience in working with all types of metals, the competent use of modern manufacturing equipment and facilities, extensive research and an intimate knowledge of the user's requirements and the conditions under which Hackney Containers would be used. Today, while there are restrictions on metals, there are no priorities on knowledge, skill, imagination and Hackney's interest in product improvement. These are continuing. These are your assurance of the continued superiority of Hackney Containers.

Hackney

PRESSED STEEL TANK COMPANY

General Offices and Plant:
1457 So. 66th St., Milwaukee, Wisconsin

Containers for Gases, Liquids and Solids

Millers Endorse Program Of Flour Enrichment

Convention keynotes enrichment program, wartime transportation, packing problem, wheat storage

WITHOUT a dissenting vote members of Millers' National Federation, at its 40th annual convention in Chicago on April 28 and 29, adopted a resolution urging enrichment of all family flour. This action was taken following presentations by R. R. Williams, who synthesized vitamin B_1; G. Cullen Thomas, industry member of National Research Council Food and Nutrition Board; and Dr. W. H. Sebrell, U. S. Public Health Service, in support of such a step.

Dr. Williams emphasized the need for nutritionally fortified foods, particularly in southern states where the income level is low, and cited evidence to show that enriched flour selling at a higher price than other family flours did not accomplish the purpose for which it is being made. He urged enrichment of the low-priced flour and indicated the possibility of enrichment by Federal legislation if not done voluntarily.

Mr. Thomas explained the possibilities of an expanding market for white flour through the rationing of sugar and the increased expenditure of energy resulting from the nation fighting a war. Increase in energy expended is estimated to require from 10 to 25 percent increase in food calories intake. Sugar rationing is estimated to reduce per capita consumption 10.8 oz. per week. Assuming that white flour is used to supply more than one-half of the extra food calories required, flour consumption would be increased from the present 154 lb. per capita to an estimated 207 lb. To meet that flour demand, mills would have to produce more than 140,000,000 bbl., a third more than at present.

Dr. Sebrell announced that all government agencies, including army and navy, having to do with nutritional matters are supporting the enriched white flour and bread program, and urged that a concerted effort be made to have all family flour enriched. He warned that legislation might force the production of long extraction flour and whole grain meals if the enrichment program for white flour and bread is not supported. He disclaimed any official method of enrichment.

Wartime problems dealt with on the program brought out some 350 registrants, of which 290 were flour mill executives.

Col. J. M. Johnson, Interstate Commerce Commission, urged that transportation rolling stock be used as efficiently as possible, particularly by loading to nearer rated capacity, by direct routing, and by avoiding demurrage.

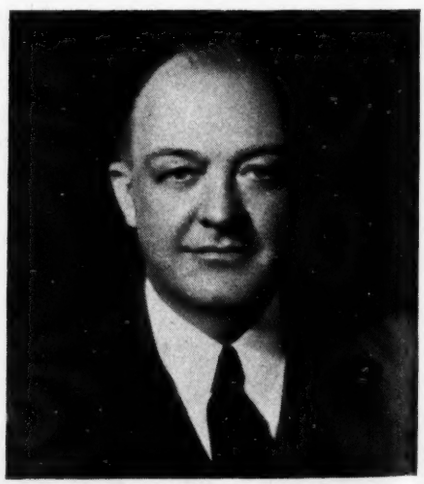
Harvey J. Owens, civilian buyer of flour in Army Quartermaster's Office, explained that subsistence of armed forces is a problem because of perishability of food, including flour.

John B. Hudson, president, Commodity Credit Corp., reviewed the wheat-in-storage and anticipated 1942 crop complications. Elevator storage capacity for 1942 crop is far short of anticipated needs. Additional construction is unlikely because of shortage of building materials. Old wheat carryover is estimated at 630,000,000 bu. on July 1 with a total of about 1,500,000,000 bu. by the end of 1942.

In assuming the duties of president-elect, Willis Helm urged an improved managerial performance in the industry for the coming year.

Army To Do Government Purchasing of Food

THE Army is to be the purchasing agent for all the principal government buyers of foods. This set-up began the first week in May when the Quarter-



FOOD MAN BECOMES DEAN

Donald K. David, until recently president of American Maize-Products Co., New York, has been appointed dean of the Harvard Graduate School of Business Administration. Mr. David also has been president of Royal Baking Power Co., a director of Standard Brands, Inc., and vice-president of Corn Industries Research Foundation.

master Corps became the buyer for canned fruits and vegetables for itself, the Navy, Lend-Lease and certain other smaller purchasers. WPB has arranged this plan to eliminate the bidding of one government agency in competition with another. It is expected that the plan will be extended to most manufactured foods.

Glass Container Designs Frozen

WPB limits sizes, designs to existing molds to increase output by 30 percent. Beer bottles restricted

WPB has issued Limitation Order L-103, freezing all glass container designs to existing molds except where certain conditions are met, such as permitting the manufacture of glass containers on machines normally used for other container materials. The use of a specifically authorized design never previously made in glass, the packing of a product not previously packed in glass, and minor changes to permit a lighter or more efficient container, are also covered by exemption rulings.

The order does not restrict the sale, delivery, or use of glass containers which were completely manufactured by May 11, date of issuance. But no mold may now be replaced except by a mold conforming to the specifications of a standard container. By January 1, 1943, the industry must have installed standard equipment and only containers of specified sizes may be manufactured after that date. Malt beverage bottles, however, must contain only 12 fluid ounces, one quart, or one-half gallon, effective immediately.

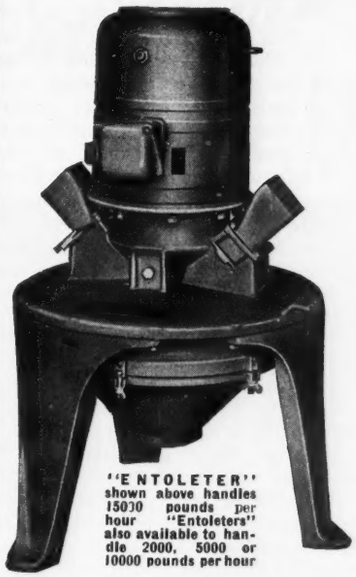
This order is expected to increase the output of glass containers by 30 percent.

Alcohol From Sugar No Longer Necessary

Use of raw sugar for alcohol making is being stopped. Valuable service on the part of the food and beverage industries has made possible other raw materials.

But the relief so achieved may not be permanent unless additional new alcohol sources are tapped. There may be a need for as much as 200 million gallons of additional alcohol for the synthetic rubber program when it gets well under way. Further work is developing new food plant sources, the object being to use surplus corn or wheat instead of sugar. To some extent the alcohol plants themselves are being converted to use these raw materials.

Protect Food for Victory



"ENTOLETER" shown above handles 15000 pounds per hour "Entoleters" also available to handle 2000, 5000 or 10000 pounds per hour

Let ENTOLETER INFESTATION DESTROYER REG. U. S. PAT. OFF.

protect your product from INSECT INFESTATION

this *proven* method Will positively destroy 100% of any insect eggs in any free flowing material

or other forms of insect infestation which may be waiting to ruin both your product and your reputation.

Actual plant operating records and certified Laboratory tests offer conclusive evidence that the "ENTOLETER" method of total destruction is 100% efficient.

NO RETURNED GOODS

Installation of an "ENTOLETER" immediately solves the returned goods problem — *by completely eliminating it.* Tangible savings from the elimination of returned goods have frequently paid the cost of an "ENTOLETER" in a few months.

Prompt deliveries can be made NOW. Write us about your problem.

ENTOLETER DIVISION

The Safety Car Heating and Lighting Company, Inc.

230 Park Avenue **New York, N. Y.**

"ENTOLETER," our registered trade-mark, identifies our insect infestation destroying equipment.

CAPITAL VIEWS

PRICE CEILINGS—Some of the price ceilings fixed on foods are likely to bulge badly as discrepancies in price relations develop. But there is no doubt that official Washington will plug up any holes which develop and readjust prices promptly if new distortions give evidence of disturbing the general cost of living. From the outset of their planning for price control, officials have emphasized that food prices at retail must be kept reasonable, or the government cannot resist the constant pressure for increase in wages. But sooner or later something will have to be done either to raise a few retail prices or to cut back on wholesale or manufacturers' prices where retailers are found to have been selling old stocks of goods at prices related to earlier costs below those in the base month of March. Pending such adjustments, mark-up at both wholesale and retail is going to be sharply curtailed on certain lines.

PERSONNEL RAID—Industry spokesmen in Washington are urging strongly some sort of coordination to prevent further raids on technical personnel. The Navy, the Marine Corps, several divisions of the Army, all are stripping colleges and technical industry of skilled personnel to fill commissioned-officer roles. These technical men are said to make the best officers, even in jobs that do not really require scientific or technical training. But the result of present methods is a serious depletion of skilled manpower for leadership in industry. It is hoped that the new Manpower Commission, under the leadership of Paul V. McNutt, can stop the raids before there are so many men to use the guns that there are not enough men behind to make the guns. Every military unit admits the importance of conservatism; but every service still continues to take technical folks wherever they can grab them. Employers are urged to protest violently, and to take appeals through the Selective Service procedure wherever serious threat against continued operation of essential wartime industry is found.

STATE BARRIERS—Food executives troubled by barriers of state or local laws that are discriminatory can take encouragement from the definite effort of the Commerce Department to develop means by which a national, rather than local, view may be imposed in such matters. Companies are asked to send in information of "specific instances in which they (state or local restrictions) are definitely impeding the operation of the war machine." The government will then bring pressure to bear for repeal, or at least suspension.

NO MORE METALS—The shortage of metal is so serious that from now on substantially no steel, brass or other metallic materials will go anywhere except into the making of guns, ships, tanks, planes or other transport and fighting weapons. Almost no allocations of metals will be permitted even for plants in which to manufacture urgently needed commodities. Some kind of makeshift with existing equipment, or that which is begged or borrowed from somebody else, will be required from now on. Even with these drastic measures rather rigorously applied, we will have too little metal to carry out in full some important parts of the war program. Tightening up rather than relaxation may be expected for some time to come.

VALUE OF BRANDS—Officially there are repeated disclaimers that price control and other official factors in the law are intended to destroy the value of private brands. Confidentially, however, it is admitted that this may be a secondary effect of those wartime actions which force down to a monotonous level many of the distinctive characteristics of quality products. Officials asked about this trend are likely to reply caustically. They commonly remind complainants that it is better to be allowed to manufacture something than to be put wholly out of normal business as was the automobile maker.

MORE "FREE TRADE"—The hearings of May indicate no let-up in the effort of the State Department to negotiate more trade agreements which will seriously cut import duties on many Latin American goods. The list of commodities being considered in discussions with Mexico adds greatly to the list of goods which will no longer be afforded protection. Another move toward free trade, Secretary of State Hull's lifetime ambition, is found in Canadian discussions; under the urge of war speed-up it is proposed to suspend import duties and cut out customs inspections. Food manufacturers who depend on tariff protection are thus exposed to increased competition from abroad.

Finding a new way to package your product is, at best, a bothersome problem. But the search may lead to a *better* package. Consider *ZIPP* Vegetable Parchment Tubing! Here is a package that is low in cost, easy to handle, and can be attractively printed. *ZIPP* Tubing is now successfully carrying dried powdered fruits, cheese, dog-food, ice-cream, sausage meat, and a variety of other food products. Let us send you samples and complete information.

IDENTIFICATION, INC.

4543 N. Ravenswood Ave., Chicago, Ill.

Manufacturers of ZIPP Vegetable Parchment Casings

Grade Labels Get Publicity Service

New organization will promote industry-consumer relations on AMS inspection and labeling

U. S. continuous inspection and U. S. grade labeling, started in 1939 by AMS as an aid to the canning industry and consumers, has progressed to the point of establishing a U. S. Inspected Foods Educational Service, with headquarters in New York. The national, nonprofit organization, sponsored by canners subscribing to the AMS service, will make information on the service available to the buying public and promote consumer acceptance of brands marked with the U. S. insignia.

While the sponsoring group is composed of members of the 45 plants originally participating in U. S. Continuous Inspection, any canner of fruits or vegetables in glass or tin is eligible for membership in the Service if approved by the Agricultural Mar-

DIRECTOR OF NEW IFES

Polly Gade will direct the activities of the recently formed U. S. Inspected Foods Educational Service

keting Administration. Headed by Miss Polly Gade, home economist, the new Educational Service will prepare material for consumer study groups, Women's Club meetings and Home Economics demonstrations, and will interpret consumer needs to its sponsoring group.

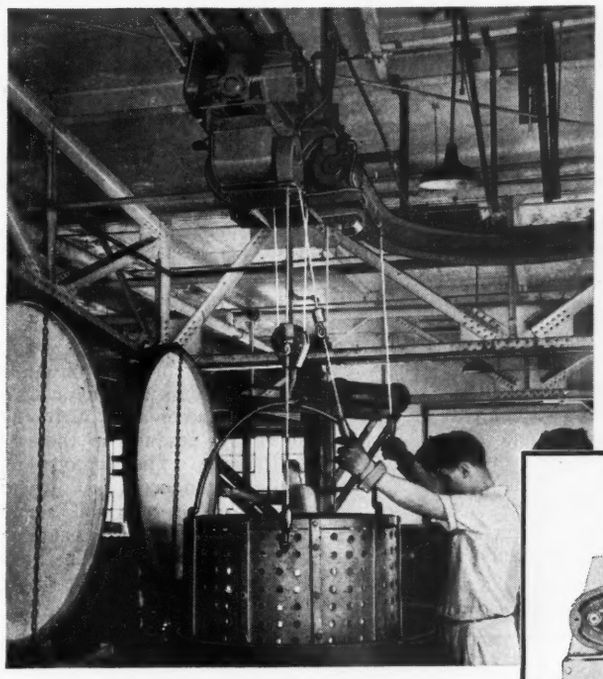
Plants approved by the U. S. Department of Agriculture for Inspection Service for 1942 to date include:

Adams Packing Co., Auburndale, Fla.; F. E. Barth Co., Centerville, Calif.; H. C. Baxter & Brothers, Hartland, Me.; Belle Glade Canning Co., Belle Glade, Fla.; Bercut-Richards Packing Co., Sacramento, Calif.; Blue Lake Producers Cooperative, West Salem, Ore.; Bordo Products Co., Winter Haven, Fla.; Cherry Growers, Inc., Traverse City, Mich.; Curtice Brothers Co., Mt. Morris, N. Y., and Rochester, N. Y.; Desert Citrus Products Association, Tempe, Ariz.; East Jordan Canning Co., East Jordan, Mich.; Farm Bureau Fruit Products Co., Bay City, Hart, Coloma, Mich.; Florida Fruit Canners, Inc., Frostproof, Fla.; Foster & Wood Canning Co., Lodi, Calif.; Fox Valley Canning Co., Hortonville, Wis.; Gibson Canning Co., Gibson City, Ill.; Illinois Canning Co., Hoopeston, Ill.; Lincoln Canning Co., Merrill, Wis.; Marshall Canning Co., Marshalltown, Iowa, and Mathews, Ind.; L. Maxcy Texas Corp., Weslaco, Tex.; Mitchell Canneries, Inc., Fort Meade, Fla., and Thomasville, Ga.; McDonald Corp., Auburndale, Fla.; Otoe Food Products Co., Nebraska City and Scottsbluff, Neb.; Owatonna Canning Co., Owatonna, Minn.; P. J. Ritter Co., Bridgeton, N. J.; Schucki & Co., Inc., Sunnyvale, Calif.; Southern Fruit Distributors, Inc., Orlando, Fla.; Spencer Packing Co., Lebanon, Oregon, and Yakima, Wash.; The G. S. Suppiger Company, Collinsville and Belleville, Ill., Converse and Mt. Summit, Ind.; U. S. Products Corp., Ltd., San Jose, Calif.; Washington Canners Cooperative, Vancouver, Wash.; Wagner Canning Corp., Eustis, Fla., and Sodus, N. Y.; Wenatchee Valley Foods, Inc., Wenatchee, Wash.; D. E. Winebrenner Co., Hanover, Pa.

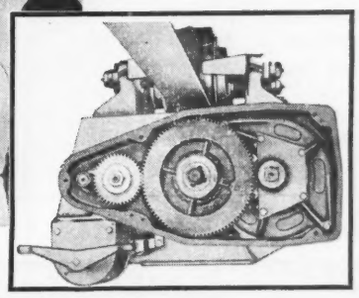
New Health Food

An excellent source of protein, fats and calories is afforded in a mixture of dried brewers' yeast and peanut butter, according to a paper by Dr. Tom D. Spies, Hillman Hospital, Birmingham, presented before American Chemical Society. A product containing 20 percent yeast and 80 percent peanut butter by weight is acceptable in taste.

Save TIME-Save LABOR! WITH R & M ELECTRIC HOISTS



Read what Crosse & Blackwell Co. says! "The 4 R & M Motor-Driven Hoists which we installed last year are helping us to do our part in aiding the country's war effort. They are both time and labor savers."



PERFECT ACCESSIBILITY!

Removal of front cover reveals ease with which all mechanism may be withdrawn, extreme simplicity, and precision engineering. Compactness reduces headroom, gives maximum strength, and increases lift.

JUST as R & M Electric Hoists are helping Crosse & Blackwell and other leading food producers save time and labor in filling wartime demands, they can help *you* by *speeding* your lifting and conveying operations.

They handle loads from any angle—with perfect balance, without sacrificing mechanical perfection. Their modern construction and advanced design assure trouble-free 24-hour service. And their many superior features guarantee the utmost utility, power and safety—with minimum headroom to conserve space!

Whether you require capacities of 1,000 or 15,000 lbs., there's an R & M Electric Hoist *tailor-made* for the job, and it can be equipped with special trolleys to fit any type of monorail. Where greater distances of movement and high-speed transportation are essential, investigate R & M's complete line of Motor-Driven Trolleys.

The following R & M Food Hoist distributors, or your nearest R & M sales and service office, will be glad to furnish complete details. Or write for factual Bulletins 6161A and 7171A.

SPECIAL R&M FOOD HOIST DISTRIBUTORS

Sprague-Sells Corp.....Hoopeston, Ill.
Berlin Chapman Co.....Berlin, Wis.
Chisholm-Ryder Co.....Niagara Falls
Dunkley Co.....Kalamazoo, Mich.
F. H. Langsenkamp Co.....Indianapolis
A. K. Robins & Co.....Baltimore

ROBBINS & MYERS • Inc.

HOIST & CRANE DIVISION • SPRINGFIELD, OHIO

MOTORS • FANS • MOYNO PUMPS • FOUNDED 1878

War Production Board Orders

Nonmetal Containers—A rating of A-1-e has been assigned to deliveries of ferrous materials used in the manufacture of non-metal containers. This Amendment No. 1 to Preference Rating Order P-79 will speed up production of boxes, hampers and crates used in harvesting many crops, by making available the necessary nails and wire.

Food Machinery—Three groups of machinery: dairy, coffee grinding and food slicing and grinding, have been added to the 14 classes originally restricted in distribution by Limitation Order L-83. The amended order, which went into effect on May 18, permits production of new machinery for stock without authorization, but maintains rigid control over acceptance and deliveries of orders. Some delivery transactions and orders for repairs and maintenance are exempted from the ruling in the amended order. Other food machinery affected by the original order is that used for packaging and labeling, bakery, confectionery, and beverage bottling.

Tin Plate—An amendment to Supplementary Order M-21 specifically defines the different types of tin plate and makes the following restrictions on its use: no person shall use tin plate or terne plate in the production of any item or part; no person shall use hot dipped tin plate with a pot yield exceeding 1.25 lb. per base box; no person shall use electrolytic tin plate with a tin coating in excess of 0.50 lb. per base box. Exceptions granted prior to May 19, effective date of the amendment, were confirmed.

Tin plate may be used in making cans as specifically authorized by or pursuant to Conservation Order M-81, as amended, and for the manufacture of closures as specifically authorized by or pursuant to Conservation Order M-104, as amended. Baking pans for institutions and commercial bakers may contain hot dipped tin plate, 1.25 lb. per base box, and electrolytic tin plate, 0.50 lb. per base box. Dairy equipment including bottle conveyors, ice cream freezers, milk filters, receiving tanks, separators, strainers, upper and lower troughs, covers for surface type heaters and coolers and testing equipment may use hot dipped tin plate, 3.30 lb. per base box (2A charcoal). Cheese vats may also use hot dipped tin plate, 11 lb. per base box.

Production Requirements Plan—A revised, simplified form of applications for priority assistance has been announced by WPB, effective July 1. Industry branches of WPB are preparing specific directions for assignment of ratings in accordance with the importance of various products in the war and civilian economy. These processing directions will tell producers just where they stand on priorities and will assure uniform treatment for all firms handling the same type of production. The new emphasis on the use of the product rather than on existing preference ratings will constitute the basis for new simplified instructions to PRP applicants.

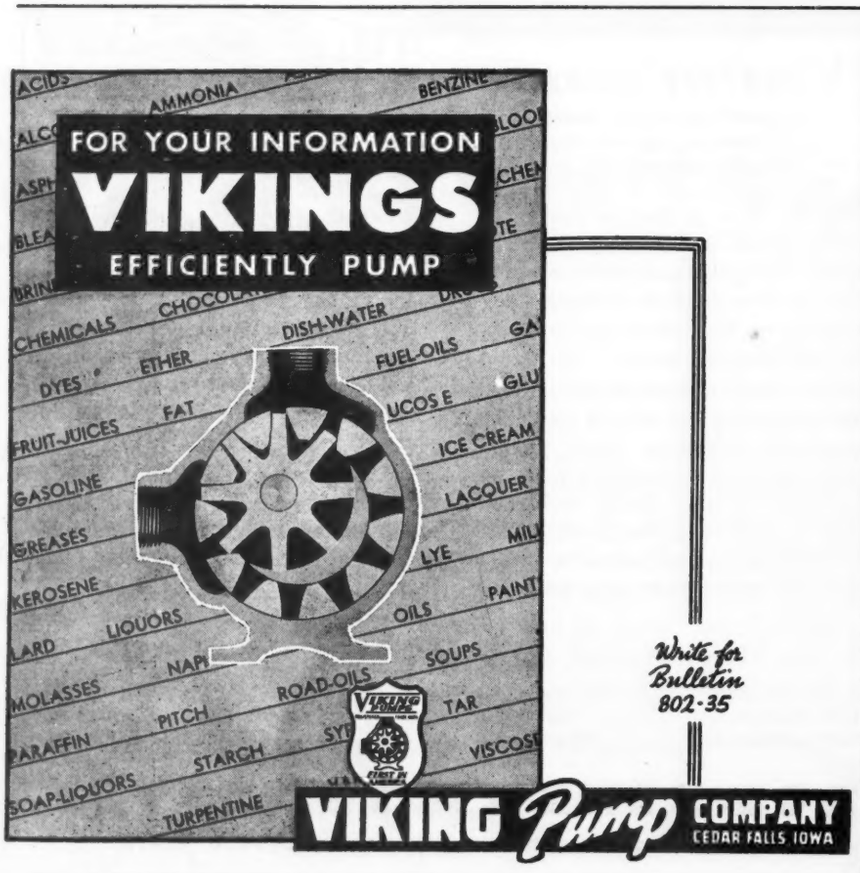
Coffee—Restrictions on the distribution of the entire United States coffee supply went into effect with Conservation Order M-135. Issued on April 28, the order fixes monthly deliveries at 75 percent of average monthly deliveries in the corresponding quarter of 1941. A wholesale receiver may not accept delivery of any coffee which, together with his stock on hand, would bring his total inventory above the amount of his monthly quota. Roasters and wholesalers are ordered not to discriminate between customers. Amendment No. 1 to the coffee order aids the roaster in disposing of excess coffee imports. A roaster's inventory of green coffee may not exceed a two months' supply, and some roasters have coffee in transit which they will not be able to accept. If the roaster notifies the Food Supply Branch (Ref: M-135) within 24 hours of the time his excess coffee arrives in this country, WPB will make the information available to prospective coffee buyers.

Soya Bean Oil—Limited use of high lauric acid oils will be permitted in the manufacture of food products during the summer months, because soybean oil and other substitutes grow rancid in hot weather. These oils, including cocoanut oil, babassu nut oil, palm kernel oil and others, may be used in certain quantities in the baking industry as a coating, in the manufacture of cookies, candy, ice cream and other edible products, until September 30, when acceptable substitutes should be on the market. Amendment No. 1 to Order M-60 permits each manufacturer of any edible product to use in June and July 50 percent of the amount he used in the corresponding month of 1941, and in August and September 25 percent.

Dairy Plants—Repair, maintenance and operation of plants processing dairy products is provided for in Amendment No. 1 to Preference Rating Order No. P-118. Effective immediately, every contract and purchase order for material to which a preference rating is to be applied must specify the date by which delivery is required. The preference rating may be applied only to the material which is to be delivered to the processor between the date of the Order and its expiration.

Cocoa Products—Chocolate and other cocoa products are restricted in Order M-145 and Supplementary Order 145-a. The amount of cocoa beans that may be ground or pressed by processors up to the end of June is limited to 38.8 percent of the grindings during the three months ended June 30, 1941. Manufacturers processing cocoa beans for the government are excluded.

Molasses—An amendment to General Preference Order M-54 on May 11 lifted restrictions on deliveries of molasses from producers and importers to bulk wholesalers. Deliveries may be made to both primary and secondary distributors of molasses for resale, subject to allocation, redistribution or redelivery by the Director of Industry Operations. Importers are required to notify the Chemicals Branch,



WPB, of any importation of molasses into continental United States at least 15 days prior to movement from point of origin. Three new priority ratings forms are provided: PD-456, for manufacturers using molasses to make yeast, citric acid, and edible sirup or molasses; PD-457, for manufacturers using molasses to make alcohol; PD-458 for producers, importers and primary distributors of molasses.

Spices—WPB on May 8 restricted distribution of black and white pepper, pimento (allspice), cassia (cinnamon), cloves, ginger, nutmeg and mace. Conservation Order M-127 and Supplementary Order M-127-a place a quota on the amount of each spice (unground, ground, distilled or mixed), that a packer may deliver monthly, and on the amount an industrial or wholesale receiver may accept. The quota is based on percentages from 50 to 100 percent of average monthly deliveries during the corresponding quarter of 1941.

Ice Cream, Sherbets—Manufacturers have been asked by WPB to make only 20 different flavors of ice cream and not more than two flavors of sherbets. And in its Recommendation T-257, WPB asks that only two grades of ice cream be made in any state, with not more than 10 flavors in either grade. It is further desired that not more than two flavors be sold monthly in 5-cent cups, and that the production of ice cream in novelty forms be restricted to not more than five types each month.

Air Conditioning, Refrigeration—New installations of air conditioning and refrigeration equipment, except for war and essential civilian requirements, were banned in Limitation Order L-38. Production and sales of this equipment are rigidly restricted. From May 15 to June 30, producers may not manufacture any new equipment in excess of the number of such items delivered on preferred orders from April 1 to May 15, or in excess of the number of such items for which unfilled preference orders are now on hand.

"Here—I looted these two cubes of sugar from the club!"

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MODEL C

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Especially designed to accelerate routine control work in the determination of vitamins and minerals without sacrificing established standards of accuracy. A universal control instrument to accommodate all fluorometric, colorimetric and nephelometric determinations.

Literature on request.

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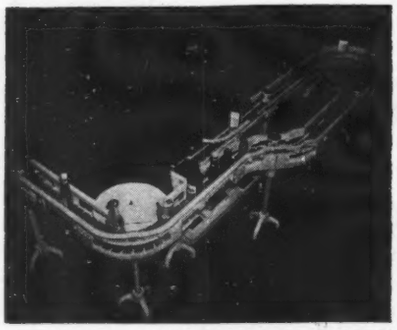
Save Space with A-1 CONVEYOR CHAIN



Conveyor for bottles, packages and cans showing sharp curves with the accumulating table, Type BC1

Goes Around Obstructions

Suitable for all types of food plants, "A-1" Flexible Conveyor Chain permits more conveyor units, or assembly lines, to be installed—with least loss of space.

Positive, swift conveyor movement is possible—and, by the exclusive swivelled joints, sharp radius curves may be turned, without gears or sprockets.

"A-1" Flexible Conveyor Chain may be applied to many standard types of conveyors, increasing the capacity, lowering the maintenance costs, and fitting them to bypass pillars or new machinery. Or we will furnish complete new equipment.

Built in a range of types to fit the needs of various food product industries.

TYPE BC-1,

shown above, is for the bottle and can conveyors. Will turn sharp curves to go around obstructions, or fit into corners—leaving maximum of free space in workroom or process room. Swivels in all directions. Links of hard bronze, with ample provision for lubrication.

TYPE CC-2

—will go around a corner without gears or sprockets. This link can be used for replacements on old conveyors. No Pins or cotter pins, rivets or set-screws needed. Links removable without the use of tools.

Permit us to work with you in solving any conveyor problem. Write for complete Bulletin F-1, giving full details and dimensions.

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Office: DOVER, N.J.

Standards Go Forward; And Also in Reverse

ACTION on food standards has been moving slowly. However, the long-pending cheese standards nears completion and a new docket has been announced, the latter being the proposed standards of fill of container for canned shrimp, published in the May 2 *Federal Register*. The shrimp hearing begins June 3.

Proposed standards of identity were issued on May 19 for canned fruit cocktail, being published in the *Federal Register* for May 20.

Meanwhile, three moves have been made to change established standards. The standards of quality and container fill for canned fruit cocktail were reopened on May 11. The standard of identity for canned peas was also scheduled for an amendment, to provide for the addition of inorganic calcium, sodium and magnesium compounds as optional ingredients for the purpose of retaining color. And a formal petition requesting reopening of the jam and jelly standards was received from National Preservers Association. This forecasts renewal of the label and sweetener discussions.

PROGRAM

Third Annual Meeting Institute of Food Technologists

Hotel Nicollet, Minneapolis, Minn. • June 14 to 17, 1942

Registration: Sunday afternoon, June 14; Monday all day, June 15

Slogan: "Conserve for Victory!"

MONDAY, JUNE 15

9:30 A.M.—General Session, President L. V. Burton, presiding.

The Role of Food Technology in War, Lt. Col. Paul P. Logan, Q.M.C.

Review of Developments in Food Technology, R. C. Newton, Vice-president, Swift & Co.

Food Technology—A Vital Factor in National Conservation, E. H. Harvey, Director of Research, Anheuser-Busch, Inc.

12:00 Noon—Luncheon Session.

Industrial Sabotage, C. W. Stein, FBI, St. Paul, Minn.

2:00 P.M.—General Session, John M. Sharf, chairman.

Substitute Materials for Food Processing

Alternate Raw Materials for Wartime Food Manufacture, R. S. McBride, Consulting Chemical Engineer, Washington, D. C.

Priority and Conservation Problems in Food Processing Equipment, George W. Putnam, Vice-president, Creamery Package Mfg. Co.

Conservation in Sanitary Practices With Acid Detergents, V. Schwarzkopf, Vice-president, Lathrop-Paulson Co.

Problems of Change in Materials Used in Final Containers, A. H. Warth, Director of Chemical Laboratories, Crown Cork & Seal Co.

Low-sugar Jellying Pectinates, Claude H. Hills, Associate Chemist, Biochemical Division, U. S. Department of Agriculture.

WPB Orders and Regulations of Interest to Food Technologists (speaker to be announced).

5:00 P.M.—Business meeting, President L. V. Burton presiding.

7:30 P.M.—Smoker at Hotel Nicollet.

TUESDAY, JUNE 16

9:00 A.M.—General session, S. C. Prescott, chairman.

Dehydration of Foods

Methods for Determination of Vitamins in Foods, B. L. Oser, Food Research Laboratories, Inc.

The Present Status of Vegetable Dehydration in the United States, E. M. Chace, Chairman, Committee on Dehydration, U. S. Department of Agriculture.

Factors Involved in the Production of Dehydrated Vegetables, M. B. Davis and C. C. Strachan, Central Experimental Farms, Canadian Department of Agriculture.

Significance of Enzyme Reaction in Reference to Dehyration, W. V. Cruess and M. A. Joslyn, University of California.

Dehydration—A Needed Food Industry, S. C. Prescott, Massachusetts Institute of Technology.

12:30 P.M.—Luncheon Session.

Labor Relations and the Food Technologist, N. W. Shefferman.

2:30 P.M.—General session, W. L. Campbell, chairman.

Packaging and Materials

Packaging of Frozen Foods Under War Conditions, H. C. Diehl and Wm. Rabak, Western Regional Research Laboratory, U. S. Department of Agriculture.

The Latest Developments in Paper and Fiberboard for Packaging Food, E. A. Throckmorton, Director of Sales Promotion. Container Corporation of America.

Glass in Its Various Forms for Food Packaging Today, H. A. Barnby, Director of Packaging, Research Division, Owens-Illinois Glass Co.

Metal Container Changes in the Interest of Tin Conservation, Roger H. Lueck, Director of Research, American Can Co.

Cellophane and Other Plastics for Food Conservation, C. F. Brown, Director of Sales, Cellophane Division, E. I. duPont de Nemours & Co., Inc.

7:00 P.M.—Banquet

Nicholas Appert Award, presentation by G. Victor Hallman; acceptance by W. V. Cruess.

Presidential Address—The Future of Food Technology, L. V. Burton.

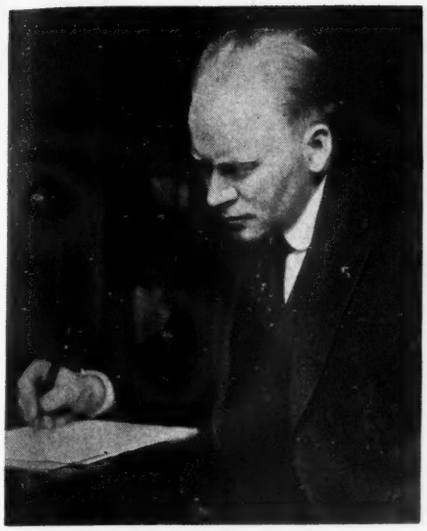
WEDNESDAY, JUNE 17

9:30 A.M.—Round-Table Discussion, "Food Plant Conversion."

L. V. Burton (leader), editor, *Food Industries*;
G. T. Reich, Pennsylvania Sugar Co.;
R. S. Scull, Burnham & Morrill;
R. C. Sherwood, General Mills, Inc.

2:00 P.M.—Round-Table Discussion, "Educational Requirements of Food Technologists."

B. E. Proctor, Massachusetts Institute of Technology, leader;
F. C. Blanck, H. J. Heinz Co.;
H. Macy, University of Minnesota;
L. K. Riggs, Kraft Cheese Co.;
C. R. Fellers, Massachusetts State College;
R. A. Dutcher, Pennsylvania State College;
W. V. Cruess, University of California;
E. H. Wiegand, Oregon State College.



GETS APPERT MEDAL

Dr. William V. Cruess, of the University of California, has been awarded the Nicholas Appert Medal given by the Chicago section of the Institute of Food Technologists. The award is for outstanding contributions to food technology. Presentation will be made at the annual IFT meeting. Dr. Cruess has for more than 30 years contributed much to the technology of these industries: fresh and dried fruits, olive pickling, wine making, canning, freezing and dehydration.

Food Committee To Set Policies

Counterpart of industrial raw materials committee. The other food agencies will continue

WHILE formal announcement of the membership of the new War Food Requirements Committee had not been made late in May, it was clear that Secretary of Agriculture Wickard will head the committee and that the membership will comprise representatives of those agencies vitally interested in food —the armed forces, Lease-Lend, OPA, Board of Economic Warfare, and so on. The characterization of the committee as a counterpart for food problems of the requirements committee in the field of raw materials—which was made by a high WPB official to FOOD INDUSTRIES —offers a clue to its authority. The latter requirements committee determines division of raw materials supplies between civilian and war demands.

It is expected that the food committee will confine its work to the all-important policy-making phases of the food problem. This means that the WPB's Food Supply Branch will continue to handle problems of food processing equipment, that the Army will still act as a government buyer for foods, and that container problems will remain with the WPB Container Branch. Each of these agencies, however, will

The Same Quality Control

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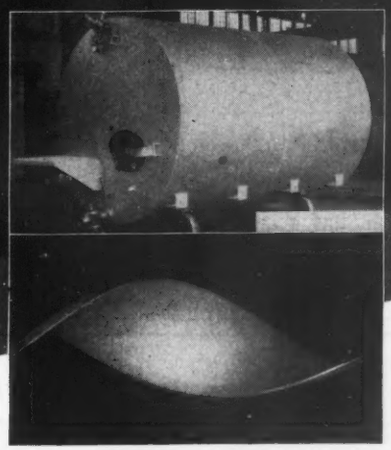
• YOU AID CONSERVATION
• YOU REDUCE YOUR MATERIAL COSTS



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Jessop SILVER-PLY Stainless-Clad Steel is a composite sheet or plate in which a layer or ply of stainless steel has been inseparably united with a mild steel backing. Food storage equipment made from SILVER-PLY Stainless-Clad Steel is easy to clean and keep sanitary . . . for SILVER-PLY offers the corrosion resisting properties of solid stainless steel on the clad side and with large savings in material costs. This is but one of many places where SILVER-PLY Stainless-Clad Steel can be used to advantage in the food processing industry.

Jessop SILVER-PLY Stainless-Clad Steel is furnished in specified claddings from 5% to 50%. Write for free literature.

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act within the confines of the broad general policies laid down by the central food requirements committee covering production and processing goals and methods for accomplishing them.

Pushes Research on Soy, Peanut Flours

SURPLUS MARKETING ADMINISTRATION, now operating as a division of the newly created Agricultural Marketing Administration, has been actively engaged in research and development work on soybean and peanut flours.

The work on soy flour, already widely available, has been principally along lines of most effective utilization, partly to augment food shipments to Britain. One of the most successful results so far has been a development of a meat sausage containing about 20 percent soy flour, which, with its 50 percent protein content, raises the sausage protein to a more concentrated food level. Much of the sausage now eaten in the British Isles contains only about 5 percent protein from its meat content. Addition of this soy flour does not change the sausage flavor or appearance, but would mean a better balanced protein diet.

The work on peanut flour has been experimental production, both on expellers and from solvent extracted nuts. Plans have been drawn up for a peanut flour plant based on the expeller process. It is understood that Georgia-Florida-Alabama Peanut Growers Cooperative has funds available to build such a plant.

Metal Container Users Must Find Substitutes

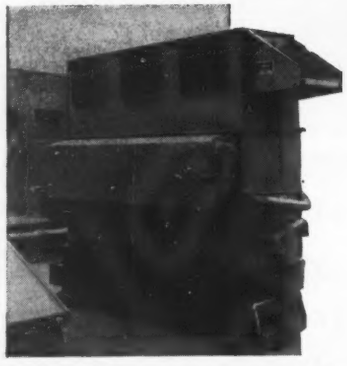
USERS of metal containers have been warned by the WPB Containers Branch that an urgently critical situation exists in steel, and that immediate and extensive use of substitutes for steel containers, particularly drums, must be undertaken. The Containers Branch pointed out that it is quite possible that steel container users may soon be forced to suspend operations until they are able to develop suitable containers which do not use steel.

Chinese Corn May Supplant Tapioca

"A PECULIAR kind of corn" sent from China by a missionary in 1909 and heretofore only an experimental oddity may hold the solution to the wartime tapioca problem. This variety of corn, waxy maize, supplies a starch similar to tapioca. It has been developed into a hybrid and will be planted in sufficient quantities this year to provide a semi-commercial trial of the starch under actual factory conditions. The research on this corn has been done by the Bureau of Plant Industry and the Iowa Agricultural Experiment Station.

New Provitamin A

A NEW precursor of vitamin A was announced by Dr. Norris D. Embree at the symposium on vitamins held in conjunction with the recent meeting of



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Cuts refrigeration costs 4 ways. Saves from 90% to all of condenser water; saves power, maintenance and installation costs. Niagara patented DUO-PASS pre-cooling prevents scale formation, lowers condensing temperatures. Write for proof in the form of operating records.

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INDISPENSABLE for
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Weighs Only 7 lbs. per foot

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SCHEDULE OF EVENTS

JUNE

1– 5—Association of Operative Millers, Olympic Hotel, Seattle, Wash.
1– 5—Association of Food and Drug Officials of the U. S., Hotel Pennsylvania, New York, N. Y.
6– 9—American Society of Refrigerating Engineers, Skytop Club, Skytop, Pa.
7– 9—Certified Milk Producers Association of America, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.
8–11—National Confectioners Association, 59th annual convention, Waldorf-Astoria Hotel, New York, N. Y.
15–17—Institute of Food Technologists, 3rd annual meeting, Nicolet Hotel, Minneapolis, Minn.
18–20—Southern Wholesale Confectioners Association, Edgewater Gulf Hotel, Edgewater Park, Miss.
22–25—American Dairy Science Association, annual summer meeting, Michigan State College, Lansing, Mich.
25–27—Potomac States Bakers Association, Cavalier Hotel, Virginia Beach, Va.
29–July 1—National Dairy Council, Edgewater Beach Hotel, Chicago, Ill.

Signal Corps

SKI TROOPS TEST RATION

More than 300 ski troops from the 87th Mountain Infantry Regiment gave the "K" Ration, or Para Ration, a field test on snow-covered Mt. Ranier, where the temperature ranged from zero to 20 above. The test lasted five days and included all types of mountain maneuvers. Not only did the troops like the ration, but it kept them in top physical condition.

American Chemical Society. Called "Kitol," the new provitamin A occurs most plentifully in whale liver oil, but is found in all other liver oils except those from certain fresh water fish. Unlike carotene, Kitol is biologically inactive but can be converted into vitamin A simply by heating to 500 deg. F. in a molecular still (one that operates under high vacuum).

Limits Refrigerator Cars To Perishables

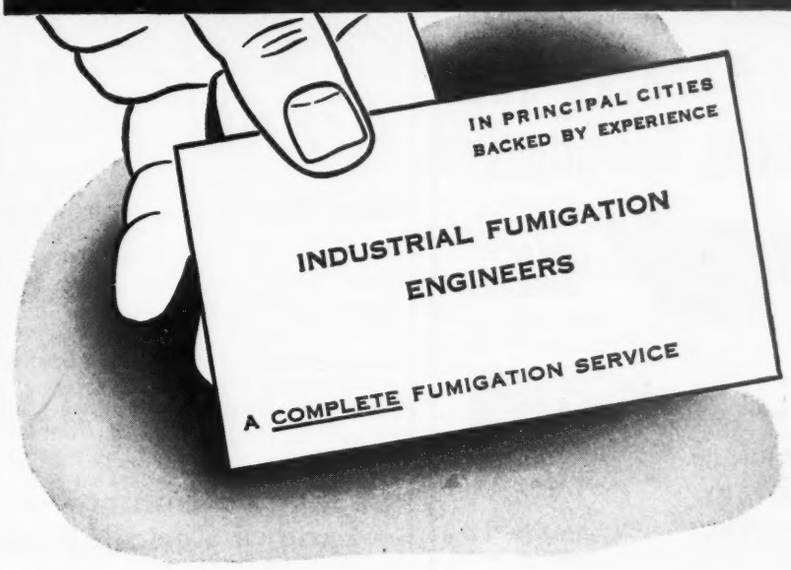
REFRIGERATOR cars should not be used when refrigerator car protection is not necessary. This is the gist of an action taken by the Office of Defense Transportation to avoid a threatened shortage in that type of railroad equipment. Instructions have been sent to the refrigerator car companies and to the railroads to distribute refrigerator cars for perishable products only.

Tank Car Regulations Hit Food Industries

TANK-CAR movement of liquid food ingredients is restricted radically under an order of the Director of Defense Transportation, effective May 15. In this ruling Commissioner Eastman specifies that no loaded tank car of any sort may move on the railroads without special permit except certain limited classes of movement definitely exempted.

The three classes of tank car movement exempted from specific permit

OUR CARD
Mr. Production Manager



HERE are the reasons why an Industrial Fumigation Engineer can give you more complete insect and rodent control and *save you money at the same time.*

From long experience with all types of infestation, under varied conditions in every type of food plant and flour mill, he can recommend the most efficient, the most economical method of control for *your* plant.

A complete survey of your premises by an Industrial Fumigation Engineer may indicate the installation of a special piping system and fumigation with Liquid HCN at specified intervals. Or, he might advise that your product be fumigated in a special room at a certain stage of production. In another situation he may suggest fumigation under a vacuum.

The Industrial Fumigation Engineer can make such specific technical recommendations—and can and will carry them through to a complete solution of your entire problem—because he knows fumigation and how to use it most economically and effectively... he provides trained workers... he protects you with liability insurance ...and he makes periodic inspections to assure you of complete pest control at all times.

We will gladly send you the name of the Industrial Fumigation Engineer nearest you. He will, if you wish, survey your plant and report his findings, recommendations and an estimate of costs—without any obligation to you.

Liquid HCN is used extensively for insect control in modern food and milling plants. It saves in time and cost compared with other methods. Food manufacturers in many fields now obtain complete, all-year control by consistent fumigation with Liquid HCN. Write for further details.

HOW ONE PLANT* CUT FUMIGATION COST BY 33%

• The counsel of an Industrial Fumigation Engineer saved a large mid-western food plant almost one-third of its previous annual costs for pest control. A regular periodic program of fumigation with Liquid HCN was adopted throughout the plant—replacing a miscellany of methods previously used. Today the plant is reported uniformly free of insects and rodents that take a toll of profits.

* *Particulars on request.*

American Cyanamid & Chemical Corporation
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Want Better *Teamwork* on Feeding and Sifting Operations?

DRAVER FEEDERS

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IF you process vital dry, powdered or granular foods consider the excellent teamwork of Draver Feeders and Bar-Nun Rotary Sifters. Draver Feeders (made in over 100 models and sizes) accurately feed . . . by volume . . . a pre-determined amount of material to the Sifter. Capacities are easily controlled by single adjustment and set lock.

Bar-Nun Rotary Sifters employ a mechanically controlled full rotary sifting motion to produce thorough separations efficiently. They use little space and power . . . equally suited for 24-hour duty on one product, or on varied types of sifting and grading work on different materials. Write for complete information.

MADE BY THE MAKERS OF:

Bar-Nun "Auto-Check" Weighers; Bar-Nun Bag Feeders and Weighers; Edtbauer-Duplex Automatic Net Weighers; Coffee Granulizers; Vibrox Bag and Barrel Packers; Ideal Green Coffee Cleaners; Magnetic Separators; Elevating, and Conveying Equipment.

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include two types of petroleum shipment and "any commodity billed to a destination over 100 miles from shipping point by the shortest available published rail tariff route." Under the latter ruling some manufacturers of sirups and other liquid food ingredients are cut off from normal rail movement to their near-by customers.

When this effect became evident, ODT promptly undertook to set up a plan of company permits for necessary and normal local movements by tank car where tank truck could not be readily substituted.

More Beet Sugar This Year

ACCORDING to the United States Beet Sugar Association, there are 100,000 farmers growing sugar beets on 1,000,000 acres in 19 states. This year, with all government restrictions under the quota system lifted, a crop topping the peak production of nearly four billion pounds in 1940 is the goal.

OPA Price Ceilings Exempt Certain Foods

FOODS exempted from the retail price ceiling imposed by OPA include fresh fruits and vegetables (except bananas), eggs and poultry, butter, cheese, condensed and evaporated milk and other canned milk products, flour (but not packaged cake or flour mixes), some processed grain products (when these are packaged in larger than 3-lb. containers), mutton and lamb, fresh fish, seafood, game, dried prunes, dry beans and nuts.

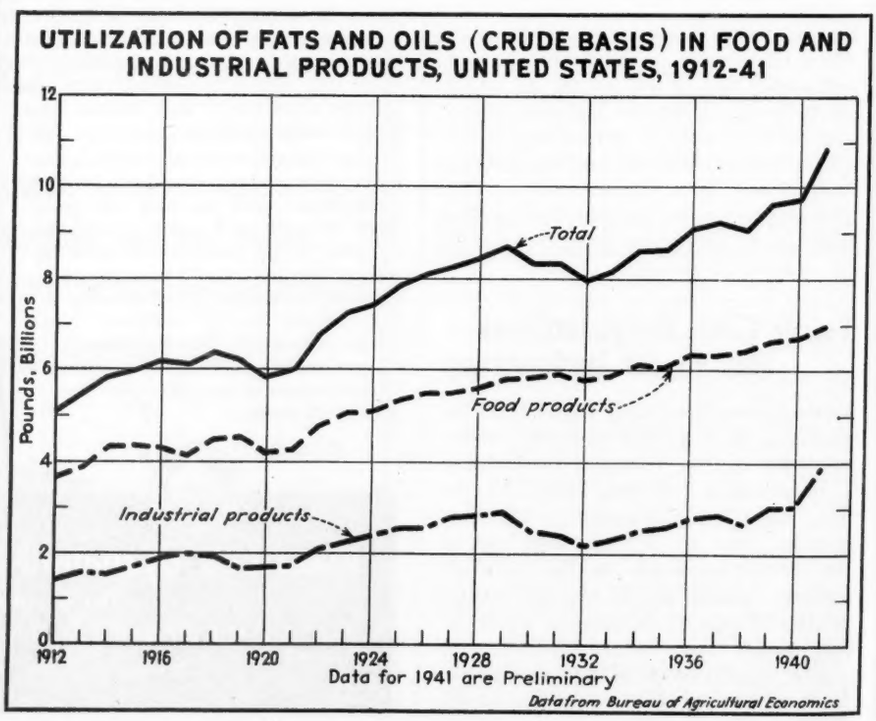
CONSTRUCTION NEWS

	Pending (thousands)	Awarded May (thousands)	Total Awarded 1942 (thousands)
Bakery	.....	.....	$50
Beverages	.....	.....	927
Canning and Preserving	$40	$40	273
Cold Storage Plants	115	150	405
Confectionery	.....	.....	.....
Grain Mill Products	.....	.....	320
Ice Manufactured	.....	.....	140
Meats and Meat-Products	160	40	183
Milk Products	920	.....	992
Miscellaneous	1,836	700	3,151
	$3,071	$930	$6,441

War Demand Cuts Fats and Oils Supply

FIGURES released by the Bureau of Agricultural Economics indicate that difficulties in supply of fats and oils for edible uses largely stem from demands of war production. In 1941 it is reported that total utilization of fats and oils in the United States was 10,942,000,000 lb., an increase of 12 percent over the previous high record of 1940. However, utilization in food products gained only 4 percent, while other uses, particularly in manufacturing industries and construction, gained 30 percent. Apparently, a large part of the fats and oils supply is now going into paint oils for newly constructed cantonments and other war purposes.

Some relief of this situation should be looked for in the near future. Private construction has ceased for the



duration and it is likely that government construction will also soon taper off. However, at least until returns are in from the oil bearing crops being planted this year the restriction of vegetable oil imports will keep the fats and oils supply situation tight.

Commodity Prices Steady

GOVERNMENT regulation of commodity prices operated to keep the markets just about steady for the month from mid-April to mid-May. The general commodity index of the *N. Y. Journal of Commerce*, at 103.4 on April 18, had fallen to 103.3 on May 16. In that period, the same publication's index for grains rose from 89.1 to 91.3, while the index for foods fell from 104.9 to 102.9. Fisher's index, at 105.4 on April 10, rose to 106.3 on May 8.

Among spot commodity prices, wheat, No. 2, hard winter, Kansas City, at $1.11 on April 18 was $1.11¾ on May 16. Flour was unchanged for the period, but corn rose from 80¼c. to 85c. Beef fell from 20½c. to 20c., lamb jumped (there is no price ceiling on lamb) from 18½c. to 24c., and pork loins upped from 27c. to 28c. Eggs fell, from 30c. to 29¾c., butter was off from 37¾c. to 37¼c., while cheese was unchanged at 27½c. Imported foods were unchanged under price ceilings. Canned tomatoes, quoted at $1.10 on April 18, fell to $1.00 on May 16. Other important canned foods were steady.

INDICATORS

Confectionery and competitive chocolate products sales in March, 1942, as reported by the Department of Commerce for 205 manufacturers, totaled $30,973,000. This figure was 28 percent over sales by the same companies in March, 1941. For the first quarter of 1942, sales by these 205 firms were $88,981,000, also 28 percent above the corresponding 1941 period.

Flour production in April, 1942, as reported by *The Northwestern Miller* for mills producing 65 percent of United States output, was 5,209,544 bbl. This compares to 5,871,055 bbl. in April, 1941.

Tomato acreage for processing this year is expected to total 607,370 acres, up 29 percent over the 469,250 acres in 1941 and comparing to a 1931–1940 average of 397,570 acres, according to the Department of Agriculture.

Beets for canning in 1942 are expected to be planted on 17,210 acres, compared to 18,500 acres in 1941 and to a 1931–1940 average of 8,810 acres.

Cabbage for kraut is expected by packers to be planted on 7,430 acres, compared to 10,760 acres in 1941. However, much cabbage for kraut is purchased in the open market, not from contract growers.

Cucumber acreage for pickles is now forecast at 124,610 acres this year, compared to 120,990 acres in 1941 and to a 1931–1940 average of 86,340 acres.

Green lima bean acreage for processing is expected to total 76,360 acres in 1942, compared to 64,310 acres planted in 1941 and to a 1931–1940 average of 35,680 acres.

Pimiento acreage for canning in 1942 is now forecast at 13,560 acres compared to 12,730 acres last year and to a 1931–1940 average of 13,770 acres.

Meat production and livestock marketings in April, 1942, were near a record, with the number of cattle and lambs dressed in Federally inspected meat packing houses the largest ever recorded for the month. Production of beef and lamb for the month was a record and pork production was the largest recorded for April in the last eight years.

Catsup production in 1941 is reported by the National Canners Association at 12,830,159 cases, all sizes, compared to a 1940 output of 11,097,516 cases.

Fishery products in cold storage on April 15, 1942, totaled 48,579,000 lb., compared to 35,757,000 lb. a year earlier.

Chicken and turkey supplies, per capita, are expected to be the largest on record in 1942.

Egg production in the first quarter of 1942 was 16 percent above the first quarter of 1941, with the rate of lay on April 1st 5 percent higher than a year earlier.

Dried skim milk production in March, 1942, at 49,800,000 lb., was the largest on record for March and was 25 percent above production in March of last year.

Chicks hatched during April by commercial hatcheries are reported at 283,359,000, the largest monthly output on record and 19 percent above output in April of last year.

Eggs, liquid, packed in March, 1942, are reported at 80,237,000 lb., an increase of 86 percent over the figures for March, 1941.

Eggs, dried, whole, produced in March, 1942, totaled 17,223,431 lb., compared to 126,276 lb. in March, 1941.

Butter, creamery, produced in March, 1942, was reported at 137,010,000 lb., 8.6 percent below March, 1941, but 6.6 percent above the 1931–1940 March average.

Cheese, American, produced in March, 1942, totaled 72,290,000 lb., 58.3 percent over the March, 1941, output and 126.3 percent above the 1931–1940 March average.

Evaporated milk production in March, 1942, totaled 335,203,000 lb., an increase of 63 percent over the 205,312,000 lb. produced in March last year.

Milk sales, fluid, during March are reported by the Milk Industry Foundation to have been 4.83 percent higher than in March, 1941.

Oleomargarine sales in March, 1942, as indicated by sales of internal revenue stamps, were 28,987,022 lb. compared to sales in March, 1941, of 29,850,818 pounds.

Sugar beet acreage in 1942 is expected to be 24 percent above the acreage planted last year.

Fruits, frozen, in storage on May 1, 1942, totaled 99,852,000 lb., compared to 81,918,000 lb. on May 1, 1941, and to a 1937–1941 average of 73,945,000 pounds.

Vegetables, frozen, in storage on May 1, 1942, totaled 53,136,000 lb., compared to 48,649,000 lb. one year earlier.

Butter, creamery, in storage on May 1, 1942, totaled 37,183,000 lb., compared to 17,795,000 lb. on May 1, 1941, and to an average on May 1 in 1937–1941 of 24,952,000 pounds.

Cheese, all kinds, in storage on May 1 of this year was 204,307,000 lb. The figure one year earlier was 108,335,000 lb. and the average for May 1 in 1937–1941 was 84,396,000 pounds.

Eggs, case equivalent, in shell or frozen storage, totaled 8,895,000 cases on May 1, 1942. One year before the quantity was 5,685,000 cases and the average for May in 1937-1941 was 5,985,000 cases.

Poultry, all kinds, frozen, in storage on May 1 of this year was 96,441,000 lb., compared to 101,129,000 lb. on May 1, 1941, and to an average on May 1 in 1937–1941 of 82,573,000 lb.

Meat, all kinds, in cure and frozen storage, totaled 811,362,000 lb. on May 1, 1942. The total one year earlier was 966,081,100 lb. and the average for May 1 was 787,666,000 lb. in 1937–1941.

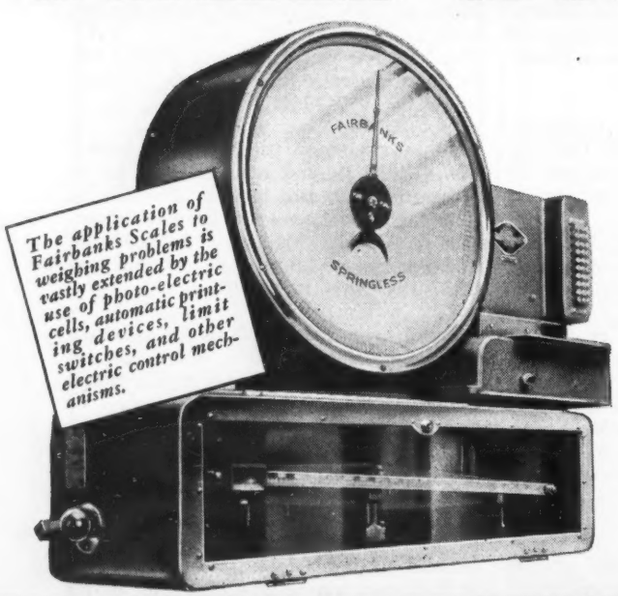
Lard in storage on May 1, 1942, totaled 120,392,000 lb. and rendered pork fat in storage on that date totaled 5,662,000 lb. The combined figures for these two products on May 1, 1941, was 327,698,000 lb. and the average for the two on May 1 in 1937–1941 was 210,923,000 pounds.

Cost of living index of National Industrial Conference Board stood at 96.1 at the end of March, 1942, compared to 95.1 a month earlier and 86.3 a year before.

Business activity index of *Business Week* registered 179.2 on May 9, 1942, up from 178.5 on April 11, 1942, and comparing to 152.8 on the corresponding date in 1941.

Weekly wholesale food price index of Dun & Bradstreet was $3.68 on May 12, having held steady for three weeks. A year before this index was $2.93.

SCALES Grow Obsolete, TOO!



The application of Fairbanks Scales to weighing problems is vastly extended by the use of photo-electric cells, automatic printing devices, limit switches, and other electric control mechanisms.

Scales without modern features may be as unsuited to your *present* needs as the car you bought thirty years ago . . . may be needlessly retarding production and increasing costs.

For scales have acquired amazing new abilities. They weigh even while materials are on the move. At the touch of a button they print weight records far faster than a man can read and write them . . . and without the inevitable human errors. They count small parts and products. They weigh and disburse preset amounts automatically, and can keep ingredient proportions secret!

Let Us Help You

Fairbanks Scale engineers are thoroughly familiar with the application of improved scales to today's industrial methods and processes. Perhaps they could suggest modernizations which would prepare your present scales to serve you more efficiently, or uses in which specialized new scales would swiftly repay their cost. Write Fairbanks, Morse & Co., Dept. F209, 600 S. Michigan Ave., Chicago. Branches and service stations throughout the United States and Canada.

FAIRBANKS·MORSE SCALES

DIESEL ENGINES ELECTRICAL MACHINERY MAGNETOS RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS MOTORS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

MEN · JOBS · COMPANIES

INDUSTRY

American Molasses Co. and its subsidiary, Boston Molasses Co., packers of "Grandma's Molasses" have released a timely illustrated booklet, "A New Way To Enjoy Iron," which includes 60 recipes showing use of molasses as a sweetener.

Antigo (Wis.) Canning Co. has modernized and enlarged its plant in preparation for one of the largest seasons in its history, installing new electric motors and thermostatic controls.

Bulman's, Ltd., Vernon, B. C., is now proceeding with the erection of a new warehouse, 88x115 ft., to increase dehydrating capacity of the plant. The plant, which has a drying system of the low-temperature tunnel type, will now have a capacity of 30 to 60 tons, depending upon the type of vegetable being processed.

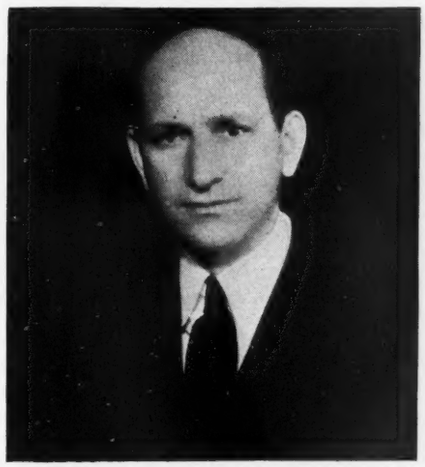
Burger Brewing Co. is continuing its protein research program at Leland Stanford University by establishment of a fellowship at that institution under Dr. McBain. Dr. Olaf Stanberg is conducting the investigation.

Continental Foods, Inc., owned by Thomas J. Lipton Corp., New York, has purchased the Thomas J. Sweet Canning Co. property at Albion, N. Y. The plant will be converted into a production center for dehydrated foods.

Corn Products Refining Co. has sold its plant and 25.93 acres of ground in Edgewater, N. J., to the Navy Department for use in assembling and shipping mobile base hospitals. For $1,100,000, the Navy acquired company property which included a nine-story building, a two-story power house, numerous other buildings and docks.

JOHN L. BOGERT

Standard Brands, Inc., has elected John L. Bogert a vice-president of the company. Mr. Bogert, formerly vice-president and director of Benton & Bowles, will be in charge of research and development, including technical research, new products, market and consumer research.



DR. CHARLES N. FREY

Dr. Charles N. Frey, director of research, Fleischmann Laboratories, Standard Brands, Inc., was recently elected chairman of the American Chemical Society. Chairman-elect for 1943 is Professor Vincent du Vigneaud, head of the department of biochemistry, Cornell University Medical School.

HENRY W. JEFFERS, JR.

Walker-Gordon Laboratory Co., Plainsboro, N. J., has announced that Henry W. Jeffers, Jr. has become president of the company, succeeding his father, Henry W. Jeffers, Sr., who will continue active in the organization's affairs as chairman of the board. Mr. Jeffers, Jr., has been vice-president of Walker-Gordon since 1929.

Cranberry Growers, Inc., will construct a $500,000 cranberry canning and freezing plant in Markham, Wash.

Friend Brothers, Inc., Melrose, Mass., is conducting a research project to develop a new type of container that can be used for packing baked beans and other products banned from tin by the WPB tin-conservation order.

The General Board of Dairy Research, New York, has offered its services to the government to aid in war undertakings, putting at the nation's disposal its research facilities in all sciences affecting dairy husbandry and dairy industrial processing.

Jel Sert Co., Chicago, Ill., manufacturer of gelatine desserts, has moved into its new 30,000-sq. ft. plant in the Clearing Industrial district of that city.

LaChoy Food Products Co., Detroit, Mich., has sold its factory, opened there three years ago, and has moved production to Archbold, Ohio, where it will process foods largely for Army use.

National Candy Institute on May 1 transferred its headquarters from Plymouth, Wis., to Chicago, Ill. The Association had been at Plymouth since 1931.

National Dehydrating Co. will soon begin operation of its National City, Calif., plant which was damaged by fire last December. W. Wardlow is superintendent.

Sperry Flour Co., western division of General Mills, Inc., is now observing the 90th anniversary of its founding in California during the gold-rush days.

Spur Bottling Works' plant at Pocohantes, Va., suffered damages amounting to $85,000 in a fire which destroyed the two-story frame building, six carloads of new bottles, and 10,000 empty cases.

Whiz Fisheries, Ltd., has been incorporated at Prince Rupert, B. C., with authorized capitalization of $50,000.

Wyoming Bottlers Association has been organized with J. E. Hurley, president of Hurley Coca-Cola Bottling Co., Casper, Wyo., as president.

PERSONNEL

Atherton Bean, vice-president of International Milling Co., Minneapolis, has been appointed senior business analyst in charge of the flour unit, OPA.

Walter A. Benz has been re-elected president of the Olive Oil Association of America.

James B. Bond, Wixon Spice Co., Chicago, has been elected president of Ameri-

can Spice Trade Association, succeeding Arthur G. Dunn.

John Burns, Burns & Co., Ltd., Calgary, Alta., has been re-elected president of the company. A. C. Newton continues as vice-president.

Dan T. Carlson, Willmar, Minn., was re-elected president of American Dairy Association, with Dr. Robert Prior, Seattle, as vice-president of the association.

Wesley H. Childs, formerly technologist for Nutrine Candy Co., Chicago, Ill., has joined General Mills, Inc., research laboratory staff.

Edward M. Farrell, formerly distributor for Blue Valley Butter, is now associated with S & W Fine Foods, Inc., in the sales department of the New York branch.

E. L. French has become chief of the Food, Drug and Industrial Chemical Products Machinery Section, WPB, succeeding R. Wilson, who resigned to become executive vice-president of Block Drug Co., Jersey City, N. J.

William Gossadge, Louisville, Ky., has been elected president of American Society of Bakery Engineers for the coming year. William H. Geller, Chicago, is first vice-president.

Dr. Max Levine, well-known carbonated-beverage authority, has been made a Major in the Army, doing technical research on water purification, sewage disposal and other problems. At present he is stationed at Fort Sam Houston, Tex.

Sid Lockhart, vice-president and general manager of Morning Milk Co., Salt Lake City, Utah, has been elected president of the company to take the place of his father, George B. Lockhart, founder of the company, who died recently.

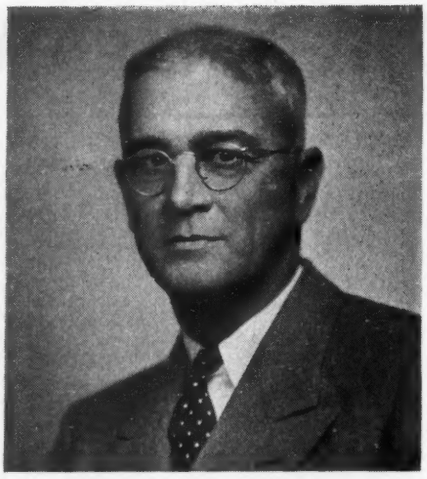
W. L. Macken, president of Fraser Valley Milk Producers' Association, and general manager of Associated Dairies, Ltd., Vancouver, B. C., has been appointed to the advisory committee of the Dairy Products division, Wartime Prices and Trade Board.

Victor E. Marx, formerly staff Chief and editor of *Bakers' Helper,* has joined the staff of American Dry Milk Institute, where he will coordinate the work of the laboratory, research work and field service into one unit for the benefit of the baking industry.

H. S. Mitchell, chief chemist of Swift & Co., has been named chairman of the Midwest Section, American Association of Cereal Chemists. F. D. Machon, Durkee Famous Foods, is vice-chairman.

Walther H. Ott has joined the research staff of Merck & Co., Rahway, N. J.

Willis E. Swift, president of Holmes-Swift Co., Augusta, Me., has been appointed Maine consultant for the food division of OPA.



CLIVE C. DAY

Clive C. Day has been elected president of Peter Cailler Kohler Swiss Chocolates Co., Inc., subsidiary of Lamont, Corliss & Co., New York, N. Y. Mr. Day was formerly vice-president in charge of manufacturing for the company.

JAMES R. T. BISHOP

James R. T. Bishop, vice-president and head of the technical and research department of American Maize-Products Co., New York, has been appointed chief of the Corn Products Section, WPB, succeeding A. E. Staley.

Porter R. Taylor, formerly chief of the fruit and vegetable division, SMA, has been appointed general manager of the Cooperative Fruit and Vegetable Association, Washington, D. C.

DEATHS

Joseph T. Cassidy, 43, head of T. A. Gilmartin Dairy, Inc., Southampton and Hampton Bays, L. I., May 10, in Southampton.

S. C. Carter, 76, for a number of years a member of Sims & Carter Co., Chester, S. C., April 23, in Chester.

Hamilton C. Fant, 75 chairman of the board and former president of C. D. Kenny Co., April 30 in Baltimore, Md.

Charles S. Hutchinson, 45, vice-president and director, Beatrice Creamery Co., April 12, in Chicago, Ill.

W. D. Lindsay, 71, former official of Welch Grape Juice Co. who retired last fall, May 3, in Westfield, N. J.

Bertrand E. Maling, 53, president of Ray-Maling Co. and manager of B. E. Maling, Inc., at Hillsboro, Ore., May 1, in Whale Cove, Ore.

Sherman N. McLoud, 53, superintendent of Gorton-Pew Fisheries Co. at Gloucester, Mass., May 6, in Middletown, Mass.

Frank P. Wheeler, secretary and general manager of Foster Canning Co., May 5, in Napoleon, Ohio.

ASSOCIATED INDUSTRIES

Allis-Chalmers Manufacturing Co. has announced that Walter Geist is the new president of the company, succeeding W. C. Buchanan who resigned because of ill health.

American Can Co. has appointed R. H. Lueck director of research, with headquarters at Maywood, Ill. Also promoted was H. W. McCormack, formerly in charge of paper milk container sales in the Atlantic Division, who is now in the general sales department in charge of all sales of paper milk containers and fiber containers.

Crown Can Co. has announced the election of Richard P. Swartz, former production manager and vice-president, as president of the company.

Enco Chemical Corp. has been announced as the new company name of Neuberg Chemical Corp., New York. Officers and personnel remain the same.

Hoffman La Roche, Inc., Nutley, N. J., has reduced the price of thiamin five cents per gram. The new price for one hundred grams is $0.48 per gram net.

Joseph T. Ryerson & Son, Inc., this year celebrates its centennial, marking one hundred years of achievement in the iron and steel industry. Since 1842, the company has grown from a small "iron store" in chicago to the largest steel-service organization in the country, with ten plants in the East and Midwest.

Westinghouse Electric and Manufacturing Co. has elected four new vice-presidents: Andrew H. Phelps, Philadelphia, general manager of purchases and traffic, formerly of McGraw-Hill Publishing Co.; L. E. Osborne, Pittsburgh, manager of the steam division; Frank C. Reed, Jersey City, president of Westinghouse Electric Elevator Co., a subsidiary; and Walter C. Evans, general manager of radio, x-ray and broadcasting.

FOOD EQUIPMENT NEWS

New Design Dehydrators

PROCTOR & SCHWARTZ, INC., Philadelphia, Pa., has designed and is building radically new food dehydrators largely of non-strategic materials.

These dehydrators are divided mainly into two different types with slight variations within each type, dependent on the kind of food to be dried, capacity requirements, etc. For large output, there is the conveyor type, which consists essentially of a feeding arrangement; an insulated enclosure where the proper temperature and air circulation is maintained for ideal results; and a conveying system for carrying the foodstuffs through. Then there is the tray type dryer, wherein the vegetables are placed in tiers of trays and heated air is circulated through them.

The Proctor organization has long been identified with dryers for the food industry, covering shredded cocoanut, bran flakes, casein, candy, corn starch, egg whites, macaroni, gelatine, grated cheese, ice cream powder, nuts, pectin, peppers, soy beans and tapioca. Today, Proctor dehydrators are drying riced, diced or sliced potatoes, potatoes in strips, shredded cabbage, diced or sliced carrots, diced turnips, diced beets, meats, and other products.

In both of these dehydrators, the circulation of heated air is through the bed of vegetables as opposed to the lengthwise or cross circulation of other dryers. Less labor is required in the conveyor type because it is almost entirely automatic and requires no more than supervision. In the tray type several men (depending on size of unit) are required for loading and unloading of trays and in some cases raking of the vegetables to present undried surfaces.

Using riced potatoes as an example of how the conveyor dryer functions, the prepared potatoes are delivered to the feed hopper, are riced automatically and deposited in a uniform layer over the surface of the moving conveyor as it enters the insulated enclosure of the dryer proper. Since the high moisture content of the potatoes at this stage requires more rapid evaporation, the layer of riced potatoes is quite thin. After most of the moisture has been removed, the layer in the second stage is many times thicker. In addition to a disturbing device midway in the first drying stage, it is in the passage from the conveyor of the first dryer to the conveyor of the second that the complete turnover of the vegetables takes place. Drying is speedy and uniformly correct. Rapidity of drying has been stressed by the U. S. Department of Agriculture as being essential to high quality results. Both types of Proctor dryers are designed for the speediest drying, freedom from contamination, and the maximum in cleanliness and sanitation.

The absence of extra handling and elimination of loss of time between operations are additional important advantages that are offered by the conveyor type dryer. In many cases, it is important to quality that there be little time loss between blanching and drying.

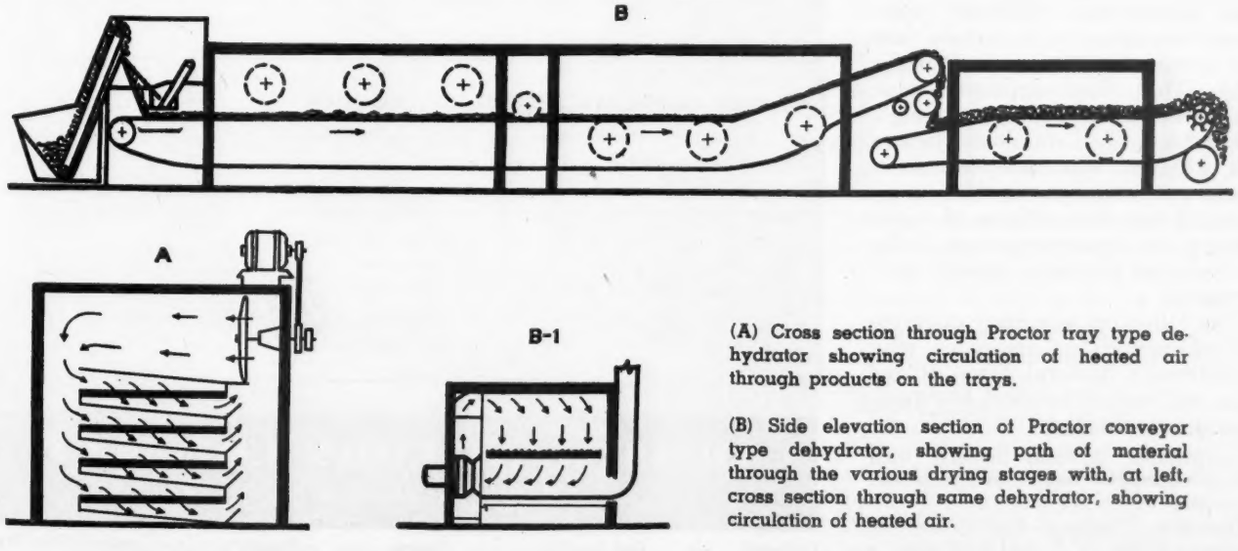
Glass Safety Coating

TO PROTECT glass from flying when shattered by concussion during air raids, Roxalin Flexible Finishes, Inc., Elizabeth, N. J., has brought out a liquid coating material known as "Roxaneal". This product is available in both transparent and black opaque types. It is applied by brushing on the interior surface of clean glass. After it has dried, the transparent type does not obstruct vision or the passage of light, while the blackout type prevents all light from passing. When dry it may be washed when necessary with mild soap solution without affecting its strength. It can be removed either by peeling off with a scraper or by washing off with solvents. This material is said to prevent fractured glass from flying and to be useful in maintaining the ability of heating systems to keep interiors warm should glass be shattered in air raids.

pH Recorder

CAMBRIDGE INSTRUMENTS CO., INC., Grand Central Terminal, New York, has brought out a multi-point pH recorder which gives simultaneous records of pH at separate and independent points on a single chart. This instrument can be used to provide a continuous "before and after" picture of pH that enables the operator to have a continuous record of the effectiveness of the process or treatment being used.

Among the uses of this device, an example would be in the brewing industry where each ingredient of the beer has



(A) Cross section through Proctor tray type dehydrator showing circulation of heated air through products on the trays.

(B) Side elevation section of Proctor conveyor type dehydrator, showing path of material through the various drying stages with, at left, cross section through same dehydrator, showing circulation of heated air.

IT'S ON THE JOB NOW!

Armstrong's Mineral Wool Board Insulation

OFFICIALLY it is only a month old—this newest addition to Armstrong's line of low temperature insulations. Unofficially, however, Armstrong's Mineral Wool Board has been on the market for several months. Over two hundred actual installations have been made, with Armstrong engineers constantly checking to be certain that this new material was structurally right. That final approval—plus the endorsement of Armstrong's Laboratory—had to come before this product was accepted as a *permanent* addition to the Armstrong Line. Now it's on the job, bearing the Armstrong name, fully endorsed for practical, reliable performance.

The following summary of physical characteristics indicates why Armstrong's Mineral Wool Board is so well suited to most low temperature applications:

Composition: Basically mineral wool with a waterproof binder, processed and cut to size.

Insulating Efficiency: Its thermal coefficient is 0.33 at 75° F., and in all respects it equals or exceeds requirements of Federal Specification HH-M-371 for board or block form insulation.

Moisture-Resistance: Both the mineral wool and the binder are waterproof.

Structural Strength: It is self-supporting and will stay permanently in place. Will not sag, settle, shrink, swell, or warp.

Odor: Armstrong's Mineral Wool Board is free from objectionable odor and from any liability to rot or mold, or harbor vermin.

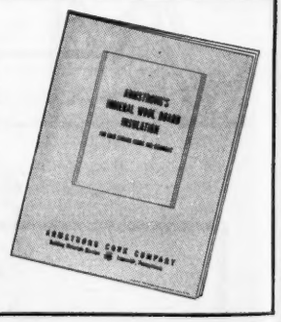
Erection: It is readily handled and erected by available labor and with ordinary tools. Application methods are essentially the same as for corkboard.

Bond with Finishing Materials: Either Armstrong's Asphalt Emulsion Plastics or portland cement plaster takes a firm bond on Armstrong's Mineral Wool Board.

Sizes: Boards are made 12″ x 36″ and in 1″, 1½″, 2″, 3″, and 4″ thicknesses. (Regranulated Mineral Wool is available.

GET COMPLETE SPECIFICATIONS NOW

The story of Armstrong's new Mineral Wool Board and complete specifications for its erection are contained in this new booklet. It also contains data on design standards for all ordinary low temperature installations. Why not send for your free copy today and find out how this efficient new material can help solve your insulation problem? Just write to Armstrong Cork Company, Building Materials Division, 916 Concord Street, Lancaster, Pennsylvania.



ARMSTRONG CORK COMPANY

Insulation Headquarters

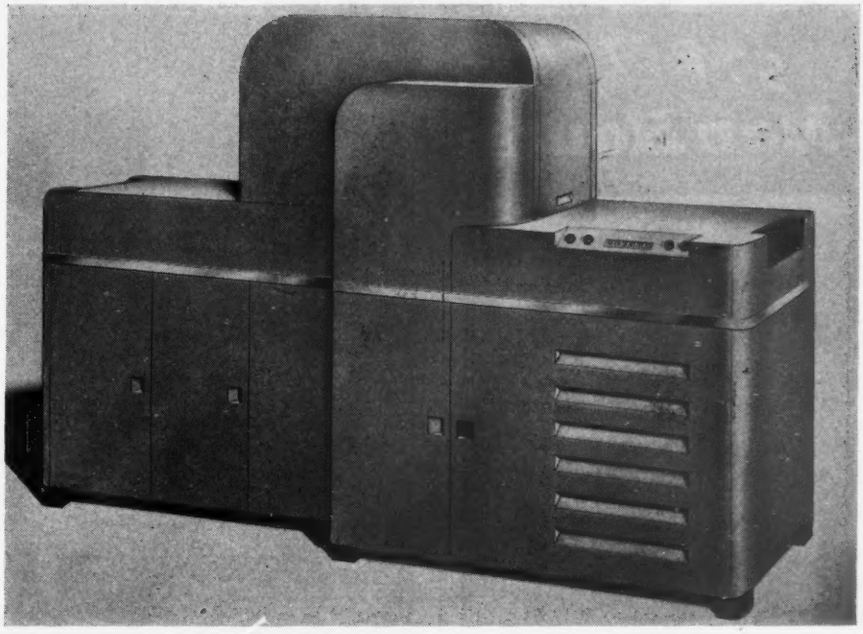
Corkboard • Cork Covering • Temlok • Fiberglas* • Mineral Wool Board

*Reg. U. S. Pat. Off. O.-C. F. Corp.

an effect on the acidity of the product. In this case, its use permits close control of pH at each stage of the manufacturing process, enabling the output of a more uniform product. Another example of the use of this instrument in the food industries is in sugar refineries, where the clarification, colloidal precipitation, color and the inversion of sucrose are largely governed by the pH of the sugar during refining.

Shrimp Deveining Machine

A SPECIAL machine designed for removing the black veins or alimentary tracts from shrimp in large quantities has been designed, making use of rubber belting manufactured by B. F. Goodrich Co., Akron, Ohio. This machine, in use at the plant of Colter Corporation, Palacious, Texas, is designed to remove the vein from the shrimp without removing the shell. Fed by four operators, the shrimp are put in a slot in the table of the machine. They then drop backward between two rubber belts which are set at such an angle that the shrimp are readily received at the top of the belt and do not fall through to the bottom. The belts carry the shrimp under a pressure wheel and over a small saw where a stream of water washes away the veins after they have been cut out by the blade. In operation, the belts are adjusted so that they hold the shrimp without crushing them and at the same time carry them over the saw in exactly the right position for the removal of the veins. The rubber belts used in this machine are of white composition, with a special ribbed surface which carries the shrimp down to the plate at the bottom as they travel toward the saw.



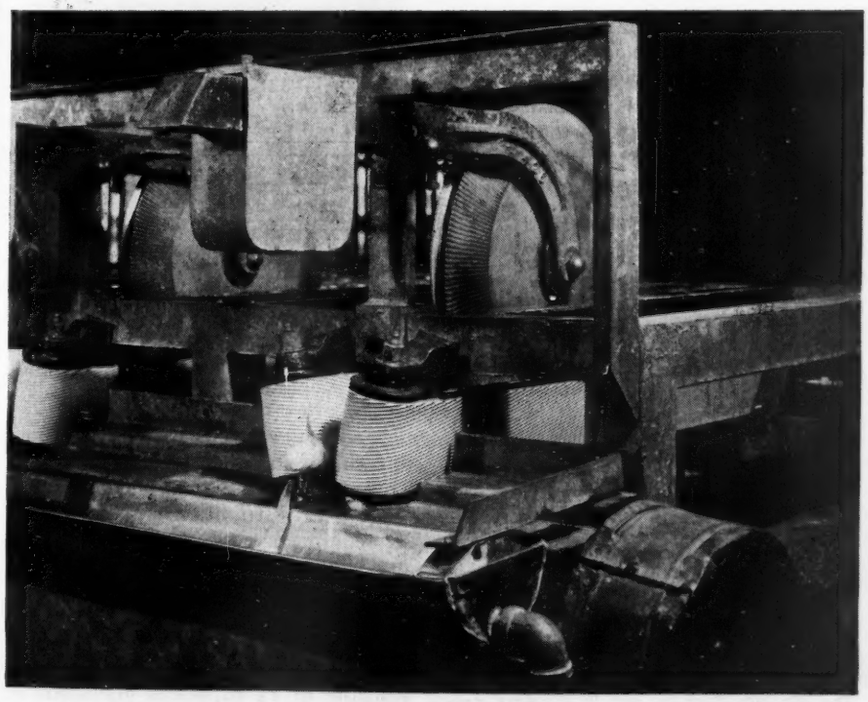
Machine for printing labels directly on containers.

Labeling Device

DESIGNERS for Industry, Inc., Terminal Tower Building, Cleveland, Ohio, has brought out a machine for the direct application of labels to cans, bottles or other containers, eliminating the necessity for the use of a paper label. Called the "Koloprint" this device automatically prints from one to four colors directly on the container. In doing so, it employs no set type, zinc plates, offset blankets, silk screens or litho stones. The printing is of the direct plate to container type and uses two special synthetic gum plates for each color desired. For use in this machine, special cold color inks of anti-acid, non-corrosive, and anti-alkali type have been developed. These inks are said to harden quickly, so that one color may be superimposed upon another, if desired.

The makers state that two types of labeling are possible with this machine. One is permanent labeling and the other is labeling with washable ink. Where the latter inks are used, in the case of bottles that are returned for refilling, the labels wash off in the bottle washer and it is not necessary to sort out the various brands, as it would be the case if permanent labels were used.

Depending on the nature of the operation, this machine is said to have a capacity of 50 to 100 containers a minute. Where a two-track machine is used, this rate can be doubled. The machine, which incorporates an "electric eye" to prevent printing on the seam of a can, is said to weigh about 2,000 lb. It will accommodate any size of container from 2 to 14 in. in length and from 2 to 5 in. in diameter.

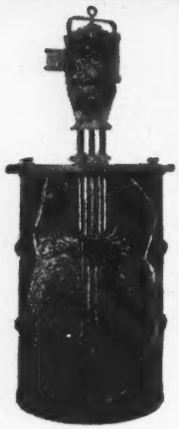


Machine for removing veins from shrimp before packing.

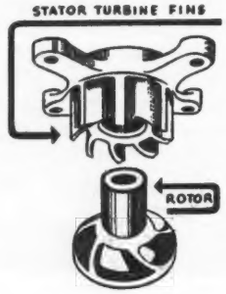
Bag Filler

FOR FILLING BAGS with sand and for other bag-filling operations around the plant, Spinks Scale Co., 656 Mayland Ave., S.W., Atlanta, Ga., has brought out a device which is called the "Sand

S-T-R-E-T-C-H
Man Hours



WITH
HOMO-MIXER'S
ADVANCED PRINCIPLE



INDUSTRY must win the race against time! But more than a great time-saver is the Eppenbach HOMO-MIXER. It's also engineered for finer diffusion.

Its principle is wholly different. There is no vortex, no air to affect the mixture. Only a fraction of the mass is worked at one time, creating more uniform dispersion. The material is rapidly forced up from the air-free bottom by the stationary turbine fins. With tremendous pressure and turbulence, the flow surges upward, outward and down. The entire batch completes this cycle in just a minute or two. No clamping to tank, no setting at angle, no vibration.

HOMO-MIXERS are doing a big job in process plants today — batteries up to a hundred! Write us!

EPPENBACH
INC.
PROCESSING EQUIPMENT
FOR OVER 29 YEARS
45-10 Vernon Blvd., Long Island City, N.Y.

Simple device for filling bags.

Bag Filler." As shown in the illustration, this consists of a metal frame for holding the bag, equipped with a means of keeping the bag opening fully expanded and with an adjustable guide to cause the shovelled sand or other products to be guided into the bag. During filling, the bag itself rests on the floor or on the ground.

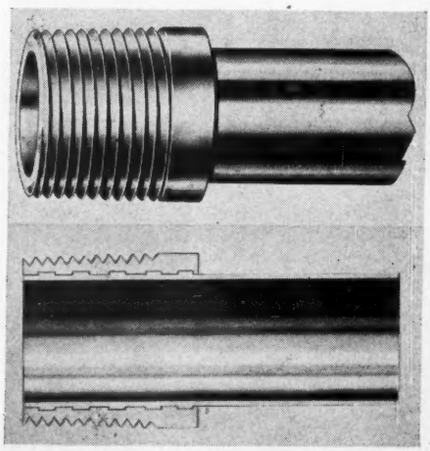
The manufacturer suggests that this device will prove particularly useful to those plants faced with the necessity of filling sand bags for protection against air raid damage.

Joint for Piping

WITH THE purpose of conserving stainless steel, Tri-Clover Machine Co., Kenosha, Wis., is offering a new type of joint for sanitary pipe lines. Known as the Wallace joint, this device permits the use of a thin-wall tubing in connection with standard threaded iron pipe size fittings of all kinds. The joint consists of a special threaded and enlarging ferrule which is inseparably joined to a length of stainless steel tubing by means of expansion.

This joint can be furnished either attached permanently to the tubing, or separately to be attached by the user. Once the ferrule is attached to the tubing, the completion of the installation is a simple matter of pipe-fitting. With this joint, all standard sizes of valves and fittings can be used as usual and there are no welding, soldering or other additional operations.

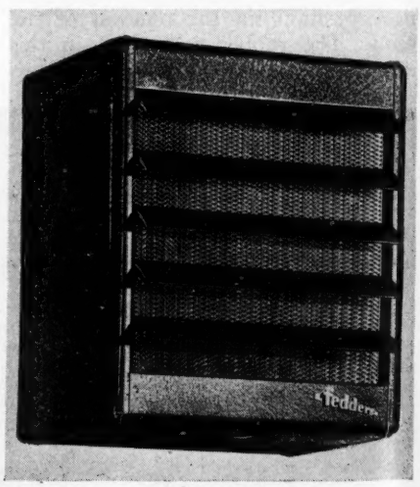
Savings resulting from the use of this method are said to be very large. For example, a 1¼ in. standard pipe weighs 2.717 lb. per ft., whereas the tube used with the Wallace joint to do a comparable job, weighs 0.759 lb. per ft. In other words, in an installation of 1,000 ft. of stainless steel tubing, there would be a net saving of 1,958 lb. of stainless steel. In this case, the bursting strength of the tube is 5,225 lb. per sq. in., which means that the only reason that the heavy pipe is used in the present sanitary lines is to give sufficient stock to allow for the thread to be cut.



The Wallace joint for use in stainless steel piping installations permits saving of metal.

Unit Heaters

FEDDERS MFG. CO., 11 Tonawanda St., Buffalo, N. Y., has brought out the Series 4 Lo-Temp unit heaters designed



New type of unit heater.

to combine low final temperatures with large cubic feet per minute and long-range heat distribution. These heaters are equipped with streamlined tubes and wide blade fans said to be of unusually quiet operation. They are designed to operate on steam pressures up to 150 lb. per sq. in., with emphasis on low final temperature. The line is available in 12 capacities graduated to suit various industrial requirements.

JUST OFF THE PRESS

BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Agitators and Mixers—"Pneumix" air-motored agitators and mixers for batches up to 200 gal., also spray equipment for both manual and automatic operation, are described in 32-page Catalog No. 80, illustrated with pictures of equipment in operation and published by Eclipse Air Brush Co., 400 Park Ave., Newark, N. J.

Air Conditioning—A condensed catalog, No. AC-152, covering its line of air conditioning, space heating, dehydration, and refrigeration equipment, with brief description, specifications and illustrations, has been issued by Carrier Corp., Syracuse, N. Y.

Heat Transfer Unit—A unit for heating or cooling liquids, semi-liquids and viscous materials, also offering a means of mixing, emulsifying, or aerating with simultaneous heating or cooling, the "Votator" is described and illustrated in a booklet issued by Girdler Corp., Votator Div., Louisville, Ky.

Materials Handling—Conveyors in use in food processing plants and warehouses are pictured and described in 6-page illustrated Bulletin No. 401, issued by Standard Conveyor Co., North St. Paul, Minn.

Materials Handling Equipment—Lift-trucks, skids, portable elevators and cranes, barrel and drum storage racks, and two and four wheel trucks are described with illustration and specifications in 160-page Catalog No. 501, published by Barrett-Cravens Co., 3255 W. 30th Sts., Chicago.

Materials Handling Equipment — The "Magic" drum and barrel carrier, a special hand trucking device for moving drums and barrels, is described and illustrated in a folder issued by Ernst Magic Carrier Sales Co., 1456 Jefferson Ave., Buffalo, N. Y.

Materials Handling Equipment—Portable, tilting belt conveyor units, Model 391, in 14 to 23 foot lengths, for loading, unloading, storing and stacking cases and bags, are described and illustrated in a 4-page bulletin of A. B. Farquhar Co., Ltd., York, Pa.

Pilot Dryer—The pilot dryer constructed and used for testing purposes and for solving industrial drying problems is described in a 16-page illustrated bulletin by the maker, Hersey Mfg. Co., South Boston, Mass.

Proportioning Pumps—Pumps of the double-ball check valve design useful for such applications as are found in the milk product industry, and other food plants, are briefly described in Bulletin 1039, of Milton Roy, 1300 E. Mermaid Ave., Philadelphia, Pa.

Separating Equipment—"Combs" equipment for screening and sifting, of suspended gyratory design, including both production and laboratory types, is briefly described and pictured, with specifications, in a new folder issued by Great Western Mfg. Co., Leavenworth, Kan.

PLANT SUPPLIES

Condensate Tester—An instrument that enables industrial plants to protect boilers from scale and corrosion caused by impurities in condensate returned from heating process equipment is the "Signalling Controller" for automatic testing of condensate purity, described with illustrations in 8-page Catalog N-95-163(1), issued by Leeds & Northrup Co., 4907 Stenton Ave., Philadelphia, Pa.

Floors—The use of Cortland emery aggregate in constructing floors for food plants is described in two publications, Bulletin 142 and Form 1763-M, by Walter Maguire Co., Inc., 330 West 42nd St., New York.

Gages—The Ashcroft Gage Book, a 64-page illustrated catalog, listing the complete line of gages and accessories produced under the name Ashcroft, has been published by the manufacturer, Manning, Maxwell & Moore, Inc., Bridgeport, Conn.

Heat Diffusers—Types 46, 46Q, 46P and 46R heat diffusers are described in a new series of leaflets giving specifications and dimensions, issued by the Carrier Corporation, Syracuse, N. Y.

Industrial Hoists—The "Lo-Hed," industrial hoist for fixed hoistings or for use as part of a monorail conveyor system, in capacities from 500 to 24,000 lb., is briefly described in a folder, Form S386E, published by American Engineering Co., Lewis Tower, Philadelphia, Pa.

Insulating Materials—"What is Mineral Wool?" is the title of Vol. 1, No. 1 of a new quarterly called "Efficiency" published by the Industrial Mineral Wool Institute, 441 Lexington Ave., New York.

Insulation—Cork insulation as used in meat packing plants is the subject of an informative 8-page illustrated bulletin put out by Armstrong Cork Co., Lancaster, Pa.

Protective Paint—Rust preventive paints for interior and exterior work, protective paints for interior walls and ceilings, and exterior paints of various types are briefly described in a recent folder, issued by the Wilbur & Williams Co., Boston, Mass.

Protective Lighting—"Plant Protection Begins With Flood Lighting" is the title of a folder dealing with protective lighting for industrial plants, issued by Goodrich Electric Co., 4600 Belle Plaine Ave., Chicago.

Traps—Steam traps of the float-thermostatic type, also compressed air traps and liquid level controls are described and pictured with specifications in Bulletin No. 450, issued by Sarco Co., Inc., 475 Fifth Ave., New York.

Unit Heaters—"Five-Way" unit heaters, designed to distribute air in four horizontal directions and downward at the same time, are described in Bulletin 46S-3, issued by Carrier Corporation, Syracuse, N. Y.

CONTROL EQUIPMENT

Control Devices—Automatic time-cycle controllers of both single and multiple cam type for industrial processes are briefly described in Bulletin No. 589 published by the Bristol Co., Waterbury, Conn.

Control Equipment—In a bulletin, Folder F-1695, motor-operated valves, control motors, thermostats and program (or time-cycle) controllers are described, including applications to dryers, proof boxes and bottle washers, by Barber-Colman Co., Rockford, Ill.

Control for Lard Makers—An instrumentation system designed specifically for control of operations in the manufacture of lard, by either the open kettle, steam, or the dry rendering processes, is described with application information and installation diagrams, in Bulletin No. 41-4 published by the Brown Instrument Co., Wayne and Roberts Aves., Philadelphia, Pa.

Control Instruments—Various types of electric control instruments, operating on the electronic tube principle, for the control of such variables as pressure and temperature and other factors, are discussed in 12-page illustrated bulletin No. Z-5000, issued by Wheelco Instruments Co., Harrison and Peoria Sts., Chicago.

Control Instruments—"Priorities and Pyrometers" is the title of a 6-page bulletin explaining how the war affects the purchase, use and maintenance of temperature controls, published by Wheelco Instruments Co., Harrison and Peoria Sts., Chicago.

Temperature Control—Electric thermometers and pyrometers, including photoelectrically balanced recorders, indicators, con-

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Fig. 407—Globe

Fig. 414—Lift Check

Fig. 554—Swing Check

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trollers and recording controllers are described and illustrated with specifications in 36-page Catalog No. 1101-G, published by C. J. Tagliabue Mfg. Co., Park & Nostrand Aves., Brooklyn, N. Y.

PACKAGING

Corrugated Boxes—"How to Stack and Load Corrugated Shipping Boxes" is the title of a 12-page booklet devoted to that subject issued as No. 2 in the Little Packaging Library published by the Hinde & Dauch Paper Co., Sandusky, Ohio.

LABORATORY EQUIPMENT

Laboratory Instruments—"New Instruments for a Modern World" is the title of a 20-page illustrated catalog of photometers, photofluorometers, electrometers and other laboratory equipment, published by Coleman Electric Co., 111 North Canal St., Chicago.

Photofluorometer—In Bulletin B-103, an electronic photofluorometer for use in assaying B vitamins and other fluorophors is completely described by Coleman Electric Co., Inc., 318 Madison St., Maywood, Ill.

MISCELLANEOUS

Hand Cleaning—"The Care and Cleaning of Hands and Arms in the Industrial Plant" is the title of a 24-page bulletin discussing the use of products made for this purpose, and their place in preventing skin irritations, published as Bulletin No. 51 by Magnus Chemical Co., Garwood, N. J.

Paint Selector—A handy means of selecting the proper paint for various applications has been issued as the Valdura paint selector, by American-Marietta Co., 43 E. Ohio St., Chicago.

Plant Location—The industrial opportunities for the location of canning, meat packing and other food plants, along with other industrial operations, are pointed out in a booklet entitled "Industrial Resources Opportunities," published by the North Carolina Department of Conservation and Development, Raleigh, N. C.

Rubber Products—A series of six pamphlets on "How To Get the Most Service Out of Industrial Rubber Products," including drive and conveyor belting, has been brought out by B. F. Goodrich Co., Akron, Ohio.

Pest Control—Insect control by means of a portable compressor and a Binks spray equipment is described in a recent mimeographed bulletin issued by Brunner Mfg. Co., Utica, N. Y.

Tea Packing—An article entitled "A Streamlined Plant for White Rose Tea" has been issued as a reprint by Jabez Burns & Sons, Inc., 43rd St. and 11th Ave., New York.

BOOKS

Reaction to Graded Beef

RETAILER AND CONSUMER REACTION TO GRADED AND BRANDED BEEF. Bulletin 479. Published by the University of Illinois Agricultural Experiment Station, Urbana, Ill. 1941. 392 pages; 6x9 in.; paper. Free.

Market studies reported in this bulletin indicate that educational effort is needed on the part of the packers if consumers and retailers are to have the information they need to buy beef intelligently. Consumers especially need to know more about what constitutes quality. They need more information about the different packers' brands and government grades and specifically what they stand for.

Most of the retailers and consumers handling or buying graded or branded beef felt that it was of superior quality and that they could depend upon its quality.

The findings reveal that some graded beef is sold to consumers in all income classes and that the demand for quality beef is not restricted to the higher income classes. There was, however, a direct correlation between the amount of fat that consumers wanted and the amount of income. High-income consumers preferred a goodly amount of fat. Most consumers wanted the lean of beef to be light red or medium red, and a high percentage wanted marbling. A surprisingly high percentage claimed to prefer yellowish fat to white fat.

British Food Manual

FOOD INDUSTRIES MANUAL. Published by Leonard Hill, Ltd., London; sold in the United States by Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y. 1942. 233 pages; 8½ x 11 in.; cloth. Price $4.

An encyclopedia of British food manufacturing, this manual contains nine sections on different phases of the industry. These sections are as follows: (I) Wheat, Milling, Flour, Baking, Flour Confectionery. (II) Sugar Confectionery, Candy, Chocolate, Jams, Jellies. (III) Canning and Preserving. (IV) Meat Products. (V) Formulae and Figures for the Dairy Industry. (VI) The Boiler House. (VII) Packing, Packing Materials, Containers, Packaging Machinery. (VIII) Food Storage and Refrigeration, Insulation, Air Conditioning, Etc. (IX) Composition of Foods.

Because volumes could be written about any one of the subjects covered in these sections, the treatment is necessarily brief. But the plant practices in the British food industry are covered in a practical, if highlight, manner. Some of these practices are at variance with American methods, because of which fact the book may suggest different technics for consideration by technologists here.

Data on Barleys

INDUSTRIAL EVALUATION OF TWO BARLEY VARIETIES GROWN IN 1940. Published by Malt Research Institute, P. O. Box 2039, Madison, Wis., 1942. 27 pages; 7x10 in.; paper. Free.

Starting in 1939, extensive research has been conducted on two barley varieties, Oderbrucker and Wisconsin Barbless. Included in the studies are the comparative malting quality of the two varieties and the suitability of the malts for processing by the brewing and other food industries. Progress made in these researches is reported in this publication. The report contains 29 tables of data, consisting of several thousand single determinations. Conclusions have not been drawn from any of the results obtained, except as they may have been influenced by environment or methods used, but anyone interested in the study and use of barley and barley malt would do well to consider the findings reported.

Handbook Revised

HANDBOOK OF CHEMISTRY AND PHYSICS, 25th Edition. Published by Chemical Rubber Publishing Co., 1900 West 112th St., Cleveland, Ohio, 1941. 2,503 pages; 5x7⅞ in.; fabrikoid. Price, $3.50 in U. S. A., $4 elsewhere.

Under the editorship of Charles D. Hodgman and H. N. Holmes, this widely used data book has been revised and enlarged to keep its contents abreast of research findings.

Of particular interest to workers in the field of food technology are the sections dealing with the properties of amino acids, constants of vegetable and animal oils and fats and waxes, and composition and nutritive value of foods, with emphasis on vitamin technology.

For the laboratory chemist and physicist, there are the old standby tables of properties, constants, conversion factors, symbols, abbreviations and reference data on a revised basis.

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LETTERS TO THE EDITOR

Monochloracetic Acid Ban Held Ridiculous

To the Editor
of FOOD INDUSTRIES:

My attention has been called to an article entitled, "Monochloracetic Acid Is An Adulterant, FDA Holds," in the January 26 issue of *Food Field Reporter*. In fairness to all concerned it would seem that some question might justifiably be raised regarding the reasons given by FDA for its opinion.

These reasons, according to FDA, are (1) that monochloracetic acid is comparable as a poison to bichloride of mercury, phenol and strychnine, and (2) that there is no evidence that it is necessary for "good manufacturing practice."

Monochloracetic acid, given by mouth to rats in a single dose, kills half around 150 milligrams per kilo body weight. The similar single fatal dose of mercury bichloride varies with the concentration with which it is administered. Standard reference works in toxicology indicate that 10 milligrams per kilo might be taken as the average fatal dose of mercury bichloride by mouth. Monochloracetic acid is therefore one-fifteenth as toxic as mercury bichloride on single oral toxic dose, and not one-half to one-eighth, as indicated by FDA. Phenol kills about half of the animals to which it is given in single doses by mouth around 600 milligrams per kilo, so that FDA is correct in saying that on single oral dose, monochloracetic acid is about five times as toxic as phenol. Strychnine kills on single oral administration at a dose of about 15 milligrams per kilo for rats and about 40 milligrams per kilo for guinea pigs. Monochloracetic acid is therefore about one-tenth as poisonous as strychnine on single oral dose instead of one-half as suggested by FDA.

One might go on to show that vitamin D, in the form of calciferol, has a toxicity about 150 times that of monochloracetic acid, since its lethal dose range is around 1 mg. per kilo.

One might also show that monochloracetic acid is only about four times as poisonous as one of the vitamin K's (methyl-naphthoquinone), which kills half the animals to which it is given in a single oral dose around 500 milligrams per kilo. It might also be noted that monochloracetic acid is about six times as toxic as benzoic acid when given in a single dose by mouth, and that it is actually in about the same range of toxicity as caffeine. If FDA feels that monochloracetic acid is so dangerous, why does it permit the greater danger of vitamin D when added to foods, or the comparable danger of the vitamin K's, benzoic acid and caffeine? And how about the dangers of lead-arsenate, for which relatively high tolerance limits are now permitted on sprayed fruits?

While the desire of the FDA to exercise the widest possible jurisdiction over harmful substances and foods is commendable, and while it is no doubt likely that Congress meant the Food & Drug Act to give all necessary power for that purpose, utilization of lethal-dose tests in the manner employed by the Department in the instant case, for the purpose of bringing any substance desired to be regulated by the FDA under existing legislation, may well result in a construction never intended by Congress. As any toxicologist knows, acute toxicity on single dose is not a fair appraisal. Any common foodstuff, from water or table salt to baking soda or vinegar, has a lethal dose, even when "pure", and may be dangerous under certain conditions. By the construction used, the Department is in the position of assuming jurisdiction to ban or otherwise regulate, if and when it should desire to do so, the use in foods of any of the common substances which mankind has been using for centuries.

Monochloracetic acid is rapidly destroyed in the body. Its toxicity on repeated oral administration of sublethal single doses has been shown to be nil. Animals have been maintained in good health for over half their ordinary life span with fluid intake throughout this period restricted to water or other beverages containing 500 parts per million of monochloracetic acid. This concentration is higher than optimum for food and beverage stabilization, and would never be desired in practice since it is enough to impart taste. Optimum seems to be about 300 parts per million. Human subjects have drunk for long periods fluids containing 300 parts per million without the slightest untoward effect. FDA admits that monochloracetic acid has been demonstrated to have no significant public health hazard. Why not then permit its use? Especially when it is so urgently needed in this war emergency.

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In my opinion, FDA reaches a ridiculous conclusion when it implies that monochloracetic acid has no place in foods, "regardless of the degree of dilution in which it exists in the articles consumed." Due to the disappearance of monochloracetic acid from foods and beverages to which it is added, it would never reach consumers in a concentration as high as 300 parts per million. Even this optimum initial concentration is seldom preferred in practice. Higher than this is definitely not wanted, since it would alter flavor. Thus, even at the relatively high concentration of 300 parts per million, it would be physiologically impossible for a consumer, even a child, to ingest at one time a quantity of the treated product sufficient to give anything remotely approaching a single toxic dose of monochloracetic acid. The stomach simply isn't big enough to hold 500 c.c. of food or beverage per kilogram (about a pint for every two pounds) of body weight. There is thus no reasonable possibility of a public health hazard from the use of monochloracetic acid in food and beverage stabilization, even as FDA suggests. Why, then, not set up reasonable standards for its use, as so urgently desired, in order to maintain the cooperation of food and beverage processors in this emergency?

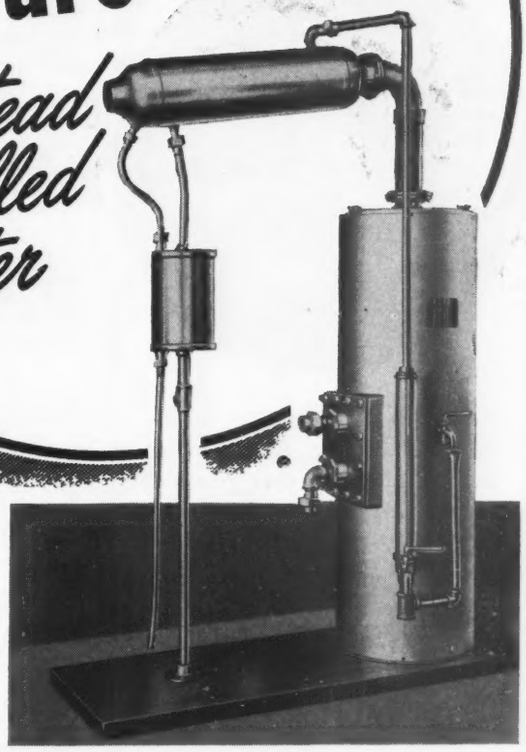
It is true that no technical reports have appeared showing the need for monochloracetic acid in "good manufacturing practice." However, field tests on a large scale for the past three years have shown its superiority to benzoic acid and its great usefulness in a variety of circumstances where nothing else is available to accomplish the desired stabilization. These circumstances are daily increasing.

There is now pressing need for food delivery to Britain, Australia, Hawaii and our armed forces wherever they may be. Dried foods are needed, in order to conserve space and weight. It is necessary to use something to prevent mold and fungus growth on such dried foods. Monochloracetic acid is well suited to this purpose, especially since it gradually splits to acetate and salt within a month or so, and disappears from the food entirely by the time the food is ready to use. Similarly, it is urgently desired for use in controlling fermentation in new proposals for the making of industrial alcohol from fruit wastes, with the residues available for stock feed.

Clearly, the FDA interpretation of the law is questionable at best, and denies to current wartime food problems the minimum consideration necessary to their adequate solution. It should be observed that the release issued by the FDA omits discussion or even citation of experimental data

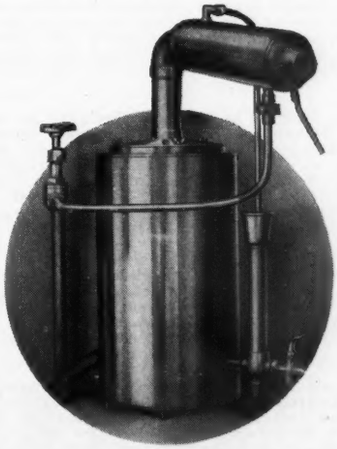
Pure Water for Pure Foods

Barnstead Distilled Water



In control laboratories throughout the food industry Barnstead Water Stills play a helpful part. By producing a distillate that is consistently pure, day in and day out, year after year, these stills furnish research men with the type of pure water that is essential for accurate laboratory work.

Barnstead Stills—ranging from ½ to 500 gallons per hour—meet not only the laboratory requirements but also the pure water needs of those plants that use distilled water in the actual production of their products.



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Hood, H. P. & Sons, Charlestown, Mass., etc.
Loose-Wiles Biscuit Co., Long Island City, N. Y.
Morrell, Jno. & Co., Sioux Falls, S. D.
Morton Salt Co., Port Huron, Mich., etc.
National Biscuit Co., New York
Swift & Co., St. Paul, Minn., etc.
United Fruit Co., New York, etc.
Ward Baking Companies
Welch Grape Juice Co., Westfield, N. Y.
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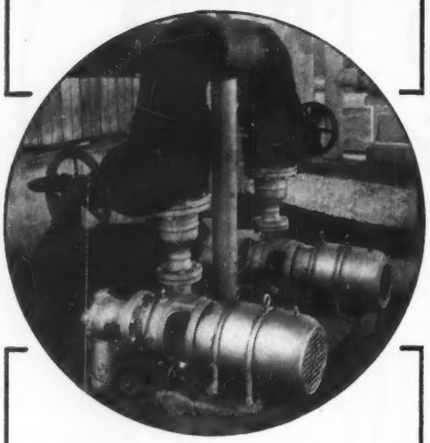

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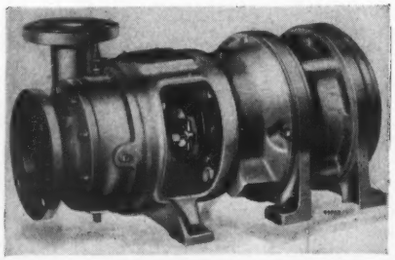

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supposedly relied upon, and that no public hearing or other opportunity to present data indicating a contrary result was afforded to any interested industry, consumer or other impartial scientific representatives. Further, in regard to this aspect of the matter, it is worthy of note that the release was not signed by the FDA or any member of its staff, and therefore is not to be regarded as an actual ruling or regulation.

All citizens desire careful administration of laws designed for their common welfare, and such administration demands reasonable interpretation for the accomplishment of reasonable objectives. To the extent that FDA insists on administrative constructions of the type here involved in a time of national emergency, it is essential to the national welfare that a correspondingly increased wariness of judgment be exercised. Otherwise, as I believe to be the fact in this case, the most sincere attempt to avert a nonexistent danger may itself result in great public harm.

May I respectfully request that these considerations be given space in your excellent journal, in order to have it clear that there may be reasonable difference of opinion with FDA on monochloracetic acid.—CHAUNCEY D. LEAKE, *Ph.D., Professor of Pharmacology, University of California Medical School, San Francisco.*

A Common Error

Professor Leake's communication brings to light a frequent error. "Food Industries" has no connection whatever with the publication named, although both have the same street address.—THE EDITORS.

PATENTS

Whole Fruit Subjected to 3 to 8 Percent Sodium Hydroxide Solution at about 90 Deg. F. to Hydrolyze Cellulose, Fibrous and Starchy Surface Structure Preliminary to Coloring, Preserving, Glaceing and Candying—Otto J. Steinwand, Oakland, Calif., to S & W Fine Foods, Inc., San Francisco, Calif. No. 2,274,874. March 3, 1942.

Milk Custard Beverage Containing Uncooked Eggs Heated at Atmospheric Pressure With Continuous Agitation to Partially Coagulate Serum Solids at Below 212 Deg. F. With Minimum Aeration of Mix Preliminary to Adding Flavoring Material and Reducing Temperature of Mix to Less Than 60 Deg. F.—Wilbert H. Hubbell, Washington, D. C. No. 2,275,225. March 3, 1942.

Cereal Products Fortified With Water-soluble Vitamin by Treatment With Water-in-oil Emulsion Containing Vitamin; Water Content Sufficiently Limited to Avoid Injurious Effect Upon Physical Properties of Cereal—Reginald C. Sherwood and John S. Andrews, St. Paul, Minn., to General Mills, Inc. No. 2,275,565. March 10, 1942.

Fruit Cooled During Passage Over Successive Series of Parallel Belt Conveyors Moving Counter-Current to Cooling Air Circulating Through System—Emmet H. Greene, El Montee, Calif. No. 2,275,588. March 10, 1942.

Dough Sheeted in Machine Designed to Reverse Direction of Roll and Conveyor Operation and to Reverse Simultaneously the Ratio of Linear Velocity of Conveyor—Frank A. Anetsberger, Chicago, and Dean H. Whitehead, Oak Park, Ill., to Frank A. Anetsberger and William A. Anetsberger, Chicago, Ill. No. 2,275,714. March 10, 1942.

Yeast Fermentation Carried on in Starch Mash Converted by Addition of Between 1 and 7 percent Unmalted, Raw, Finely Ground Millet and Between 2 and 9 Percent of Ground Malt—Erich Briess, New York, N. Y. No. 2,275,836. March 10, 1942.

Soya Oil Treated for Recovery of Phosphatide Content Soluble in Ether, Anhydrous Alcohol and Acetone but Substantially Insoluble in Dilute Alcohol—Henry R. Kraybill, Pearl H. Brewer and Max Horsley Thornton, to Purdue Research Foundation, West Lafayette, Ind. No. 2,276,317. March 17, 1942.

Waste From Citrus and Apple Juice Manufacturing Converted to Sterilized Mash and Inoculated With Clostridium acetobutylicum for Production of Volatile Solvents—Bruno Rosenfeld, Rehovoth, Palestine. No. 2,276,420. March 17, 1942.

Candy Centers Given Bottom Coating by Mechnical Means on Continuous Operating Basis—Don Swint Greer, Winchester, Mass., to J. W. Greer Co., Cambridge, Mass. No. 2,276,481. March 17, 1942.

Bread Dough Strips Cut Into Predetermined Stick Lengths by Mechanical Means—Mario A. Olgiati, Detroit, Mich. No. 2,276,545. March 17, 1942.

Eggs Cleaned by Mechanical Action of Abrasive Coated Belt—Curtis S. Jordan, Glendale, Calif. No. 2,276,581. March 17, 1942.

Yeast Grown in Medium Containing Nontoxic Oxidizing Agent to Give High Ergosterol Content—William Gordon Bennett, Epsom, England to Standard Brands, Inc., New York, N. Y. No. 2,276,710. March 17, 1942.

Starch Heated With Peroxide in the Presence of Catalyst to Produce Thin Boiling Qualities—Hans O. Kauffmann, Eggertsville, Paul H. Margulies, Kenmore, and Joseph R. Ryan, Buffalo, N. Y., to Buffalo Electro-Chemical Co., Inc., Buffalo, N. Y. No. 2,276,984. March 17, 1942.

Fruit Tested by Electro-magnetic Circuit to Determine Condition of Ripeness—Howard L. Clark, Ballston Lake, and Walter Mikelson, Schenectady, N. Y., to General Electric Co. No. 2,277,037. March 24, 1942.

Frozen Foods Packaged in Container Designed to Cause Label Defacement at Thawing Temperatures—Stanley F. Triplett, Modesto, Calif. No. 2,277,278. March 24, 1942.

Foods Quick Frozen in Chamber Divided Into Series of Narrow Elongated Passageways Equipped With Conveyors Moving Counter-current Through Stream of Refrigerated Air—Otto C. Botz, Jefferson City, Mo. No. 2,277,382. March 24, 1942.

Nuts Treated With Chlorine in Presence of Catalyst to Soften Shells—Charles H. Frazier, Cincinnati, Ohio; Mildred B. Frazier administratrix. No. 2,277,485. March 24, 1942.

Fruit Halves Pitted by Mechanical Means—Rollie B. Nawman, Oakland, Calif., to Special Equipment Co., Portland, Ore. No. 2,277,711. March 31, 1942.

Fruit Halves Turned Into Inverted Position by Mechanical Means—Frank A. Wool, San Jose, Calif. No. 2,277,940. March 31, 1942.

Edible Carcasses Given Indentifying Marks on Skinned Surface by Use of Tissue Transfer Paper—Beverly E. Williams, to Industrial Patents Corp., Chicago, Ill. No. 2,278,039. March 31, 1942.

Penicillium Camemberti Prepared in Dry Culture Form With Bran as Carrier—Gilbert B. Ayres, Stamford, and Joseph George Niedercorn, Riverside, Conn., to American Cyanamid Co., New York, N. Y. No. 2,278,234. March 31, 1942.

Penicillium Roqueforti Prepared in Dry Culture Form With Bran as Carrier—Gilbert B. Ayres, Stamford, and Joseph George Niedercorn, Riverside, Conn., to American Cyanamid Co., New York, N. Y. No. 2,278,236. March 31, 1942.

Ice Cream Made in Continuous Manner Under Pressure of Approximately 15 Lb. per Sq. In.—Charles F. Weinreich, Des Plaines, Ill., and Albert L. Voggenthaler, Cedar Rapids, Ia., to Cherry-Burrell Corp., Wilmington, Del. No. 2,278,340. March 31, 1942.

Foods With Low-starch and Naturally High-water Content Dried and Heated Under Pressure and Expanded With Sudden Release of Pressure to Shorten Their Cooking Time—Albert Musher, New York, N. Y., to Food Manufacturing Corp., Chicago, Ill. No. 2,278,463. April 7, 1942.

High-starch Cereal Food Boiled in Concentrated Sugar Solution, Strained and Dried To Obtain Sugar Coating—Albert Musher, to Musher Corp., New York, N. Y. No. 2,278,465. April 7, 1942.

Food Particles Bound Together by Sugar Coat and With Water-repelling Substance Which Quickly Disintegrates in Hot Water—Albert Musher, to Musher Corp., New York, N. Y. No. 2,278,466. April 7, 1942.

Nut Meats Subjected to Steam at Increased Temperature and Pressure Preparatory to Disruption by Sudden Release of Pressure—Albert Musher, New York, N. Y., to Food Manufacturing Corp., Chicago, Ill. No. 2,278,467. April 7, 1942.

Dry Legumes Given Quick-cooking Properties by Subjecting to Steam at Increased Temperatures and Pressure Preparatory to Disruption Upon Sudden Release of Pressure—Albert Musher, New York, N. Y., to Food Manufacturing Corp., Chicago, Ill. No. 2,278,468. April 7, 1942.

Fruits and Vegetables With Relatively Low-starch But High-sugar Content Given Quick-cooking Properties by Drying, Subjecting to Steam at Increased Pressure and Temperature and Disrupting by Sudden Release of Pressure—Albert Musher, New York, N. Y., to Food Manufacturing Corp., Chicago, Ill. No. 2,278,469. April 7, 1942.

Starch-containing Food Subjected to Solvent Extraction and Drying Preparatory to Disruption of Structure by Subjection to Steam at High Temperature and Pressure Followed by Sudden Release of Pressure and Lowering of Temperature—Albert Musher, New York, N. Y., to Food Manufacturing Corp., Chicago, Ill. No. 2,278,470. April 7, 1942.

Canadian Patents

Baked Products Mechanically Charged Into and Ejected From Oven Having Cover Plates Carrying Levers Which Actuate Grid-bearing Cheek Plates for Ejecting Baked Products—Morris Olsen, Revelstoke, British Columbia. No. 402,998. Feb. 17, 1942.

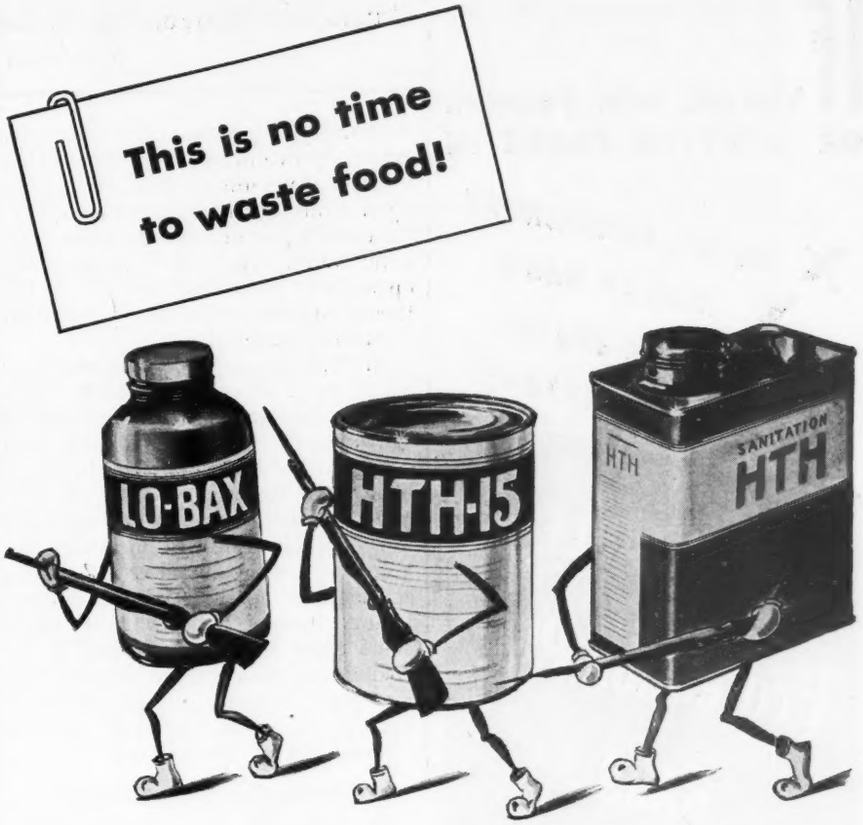
Sugar Solutions Simultaneously Clarified and Decolorized Without Filtration by Aeration and Heat Treatment to Cause Floating of Suspended Char and Floc-forming Matter Which Can be Drawn Off—Pedro Sanchez and Eugene N. Ehrhart, to Sucro-Blanc, Inc., New York, N. Y. No. 403,107. Feb. 24, 1942.

Tea Leaves Sprayed With Deterpenized Orange or Lemon Oil—Leonard M. Wright, Dunedin, New Zealand. No. 403,172. March 3, 1942.

Eggs Candled in Cartons Formed Into Individual Cells With Hole For Unobstructed Passage of Light—Kristian Heshe, Aarhus, Jutland, Denmark. No. 403,283. March 3, 1942.

Molasses Mixed With Artificially Dried Hay Flour to Make Mixture With Good Keeping Qualities—Axel Laudon, to Svenska Sockerfabriks Aktiebolaget, Malmö, Sweden. No. 403,536. March 17, 1942.

Confection Prepared by Soaking Bread in Crystallizing Sugar Solution, Baking and Applying Coating to Candied Product—Gladys E. Willis, Toronto, Ontario. No. 403,585. March 24, 1942.



Guard against Spoilage with HTH products

Insidious, unseen enemy of food and beverage plants, bacterial contamination requires a constant war against waste through spoilage. Big guns in this unending battle against bacteria are HTH Products (HTH, HTH-15, Lo-Bax).

You can check the invisible menace of spoilage in your plant by using HTH Products *regularly*. They are full-strength chlorine sterilizers — in convenient dry form. When added to water, they form dependable, fast-killing hypochlorite solutions. They protect the quality and purity of your products ...effectively minimize spoilage losses.

You will find HTH Products surprisingly economical, too. You can use them freely to flush, spray or wipe all surfaces which come into contact with foods and beverages. Write today for complete information on how to combat spoilage in your plant with HTH Products.

Hypochlorite Solutions made from HTH Products are ideal germicides for use on floors, in locker rooms and cafeterias

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HTH PRODUCTS (HTH, HTH-15 and LO-BAX) ... NUFOS ... DRY ICE ... CARBONIC GAS ... CAUSTIC SODA ... AMMONIA, ANHYDROUS and AQUA ... SODA ASH ... BICARBONATE OF SODA ... LIQUID CHLORINE ... BLEACHING POWDER ... PH-PLUS ... SYNTHETIC SALT CAKE ... SODIUM CHLORITE PRODUCTS

IF YOU ARE NOW PACKING OR SHIPPING FOODS IN

X METAL CONTAINERS
X BURLAP BAGS
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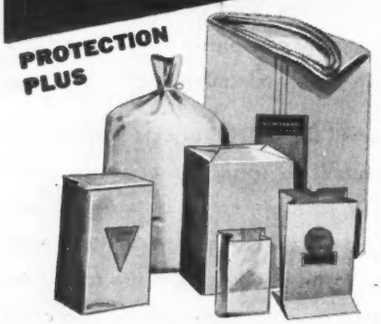
X CARTONS

EQUITABLE "Protection-Plus" BAGS MAY SOLVE YOUR PROBLEM



By processing paper stocks, by using special combinations of papers, and by new manufacturing methods, Equitable's Research Staff is daily solving the problems of many outstanding food manufacturers. Perhaps we can help solve yours.

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Paper Mill and Southern Bag Factory — Orange, Texas

Cause and Prevention of Explosion Hazards

(*Continued from page 59*)

Another type employs a thermocouple, essentially two dissimilar metals welded together to form a junction which, upon being heated, produces an electric current flow in a low-resistance magnetic valve. The valve is manually opened and maintained open while the thermojunction is heated by radiation from the burner valve.

In these classes of equipment, flame failure must allow the thermally sensitive members to cool if the fuel-control valves are to be closed and the fuel supply to the burner cut off. In actual operation, however, sources of heat other than the flame may impinge upon the thermally sensitive members and keep the fuel-supply valves open for a considerable length of time after flame failure. Such extraneous heat might come from radiant insulation in the combustion chamber, burning fuel that may have dripped upon the surface of the burner mounting wall, or hot ceramic tips of the burners.

Flame Conducts Current

To overcome these objections, the lesser known ability of a flame to conduct an electric current was employed in a combustion safeguard instrument. An electrode is introduced into the flame and connected to the instrument. As a conductor of electricity, the flame has a definite range of resistance, readily distinguished from that of any other medium. The instrument reacts in accordance with the amount of resistance in its electrical circuit, of which the flame is a part. The resistance in the circuit remains within certain constant limits as long as a flame is in contact with the electrode, and the instrument holds open valves in the burner fuel line and maintains combustion. Flame failure, however, increases the resistance in the circuit, and the instrument instantly closes the fuel valves to prevent flow of fuel to an unignited burner.

When a burner is being ignited, a pilot light, also in the circuit and in contact with the electrode, provides the necessary resistance in the circuit to enable the instrument to open fuel line to the burner.

For use with fuels other than gas that burn with luminous flames, a device incorporating a photoelectric cell is employed in place of the electrode.

Modern combustion-safeguard instruments, after shutting both main and pilot valves upon flame failure, provide a time delay for purging the chamber of combustible gases before lighting is permitted. They are designed for all applications where combustible gases might be present, and purging time is usually fixed at the factory to prevent tampering.

A guarantee against explosions resulting from failure of any part of a modern combustion-safeguard instrument or a short in the circuit is provided, as the device then closes fuel valves as it does in case of flame failure. In this manner, the safeguard protects not only against human failure, but also against any deficiency that might develop in the instrument itself.

American Canned Foods Make Hit in England

(*Continued from page 39*)

opened stock before it "went off."

Brown Beans in Demand

The American bacon we have been getting has been inferior to British bacon on the whole. We have found it far too fat and much too salty to enjoy as well as one would wish, but no doubt there are people less affected by such tastes.

But the American-produced brown beans which have been sold loose have been very popular because they are a novelty previously unknown to British purchasers, and a very welcome variation from British carrots and harricot beans and the small white Chilean beans. They take much less time to cook than either of the latter beans, which is a further point in their favor. We have used them chiefly in soup, as well as for ordinary vegetables and cheese sauce.

The canned milk that helped us through the winter, when our natural milk supply was severely rationed, was mainly "Pet," "Sealect," "Jerzee," "Dean" and "Armour's," while from Canada have come "Alberta" and "Columbia" packs. I think you were the people who introduced the British public to "conny onny" as tinned milk was nicknamed here during the last war. We have certainly never lost the habit, and in normal prewar years a vast amount of tinned milk was consumed by the working classes of our big cities in preference to fresh milk.

Find U. S. Foods Dependable

Another point which has been to the favor of American food packs re-

ceived on the Lease-Lend basis is that the British housewife can put her trust in it. We have suffered sadly from the "black market" in the food industry. When war seemed imminent after Munich, a lot of war profiteers stepped into food manufacture, much to the resentment of the regular food manufacturers, and these black sheep have been exploiting the great demand for foodstuffs and the limitation of supplies. Despite the government's price control over many commodities, these scoundrels have found a way to evade the law. Tinned fish cakes, for instance, will show a picture of five fish cakes on the label and contain only four. The food-industry journals here have exposed this racket, but still it goes on. There have been many heavy fines in the courts for manufacturers and traders selling "onion substitutes," "dried egg powder" and other fakes which contained neither onion nor egg, and for foods advertised on their labels to contain vitamins, or to equal eggs, which have no such properties. Colossal profits have been made in many sections of the food industry here—and as much as 100 percent profit is made on the sale of some articles by the leading food stores. Many people inside and outside the trade are advocating a much stronger attitude by the government, but it seems to be harder to apply the advice than to give it.

Postwar Market Seen

My experience is that American methods of food processing have a big appeal for the young, modern, progressive British housewife who will from the dominant generation of the postwar years. Whether this potential interest can be developed by increasing postwar export trade from the United States to Britain, or by the building of more food factories in this country by American firms, like the Heinz company's well-known factory here, is for American business to decide. An Allied victory will, I feel sure, do much to remove the trade barriers and import restrictions which in the past decade have done so much to hamper the sale of superior American goods, from motor cars to tinned meats, on the British market.

Liverpool Good Test City

Liverpool has always been the most American of English cities and it would prove a suitable city for such experiments. It was here, after the last war, that F. W. Woolworth Co. built the first of its British chain stores, which were such a success that they are now among the foremost of the trading concerns in this country. Closer cooperation between British and American politics should mean a closer cooperation between British and American industry.

DAILY MAINTENANCE CLEAN-UP

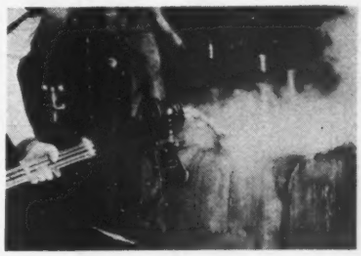
Must Move Faster Today

Here is how you CAN do it!

Help those in your plant who have daily clean-up work to do by making available to them a highly successful, widely used Oakite method for removing all kinds of food deposits from processing equipment. It makes their job easier . . . benefits you too, because

Fast Oakite Steam-Detergent Cleaning

gives you the TRIPLE combination of heat, mechanical force and effective detergent action that assures clean, sanitary surfaces on equipment. Work is performed speedily, with less manual effort . . . you save money, get better results.



Typical Equipment Where You Can Speed Up Sanitation Work With The Oakite Solution-Lifting Steam Gun

Blanchers	Syrup Fillers	Corn Cutters
Scalders	Labeling Machines	Paring Machines
Exhaust Boxes	Apple Peeling Machines	Curing Vats
Mixing Vats	Grapefruit Shredders	Cutting and Butchering Machines
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WRITE FOR FREE FOLDER giving details, specifications and prices of the Oakite Solution-Lifting Steam Gun and the Oakite cleaning materials to use with it for your type of work. Special problems invited, inquiries answered promptly.

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Snap into it!
says Uncle Sam
The 1942 quota for Canned Snap Beans is 12,500,000 cases
No decrease here! The authorized quota for 1942 is just as big as 1941 . . . and that means a busy season for packers of snap beans. The demand for cans is going to be on a par with last year . . . and Crown Can has laid its plans accordingly. As far as human skill, perfect manufacturing equipment, and a highly trained field organization can do it . . . all packers who have placed their orders with Crown will find their faith in Crown's ability to deliver the goods fully justified.
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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

DAIRY PRODUCTS

Effects of Pasteurization On Goat's Milk

SOME CONSTITUENTS and properties of goat's milk are altered slightly by short-time, high-temperature methods and holder methods of pasteurization.

Pasteurizing the milk slightly decreases the solubility of calcium and phosphorus and the soluble (albumen and globulin) protein fraction is not appreciably denatured. The curd tension is reduced considerably by the holder pasteurization methods and only slightly by short-time, high-temperature pasteurization. The flavor of fresh goat's milk is improved slightly and the keeping quality is improved considerably by pasteurization.

Results of experiments show that the effects of pasteurization on the solubility of calcium and phosphorus, on the denaturation of proteins and on the ascorbic acid content of goat's milk are comparable to the effects of pasteurization on the same constituents in cow's milk.

Digest from "The Effect of Pasteurization on Some Constituents and Properties of Goat's Milk," by H. F. Haller, C. J. Babcock and N. R. Ellis, *Technical Bulletin No. 800*, United States Department of Agriculture, Washington, D. C., November, 1941.

Homogenized Milk

EFFECTS of homogenizing under various conditions were studied to ascertain the effects on fat dispersion, titratable acidity and development of rancidity. The pressure was 5,000 lb. in all the homogenizing tests; most Michigan dairies homogenize at 2,000 to 3,000 lb. pressure. Temperatures of 40, 60, 80, 100, 120 and 140 deg. F. were employed. Butterfat did not disperse thoroughly at temperatures below 100 deg. F., *i. e.*, not until it melted. Acidity increases were greater at medium temperatures (80, 100, 120 deg. F.) than at 60 or 140 deg. F. but did not reduce the slight rise in acidity caused by homogenizing. The increase in acidity was too small to affect the flavor. Homogenizing raw milk at 130 deg. F. and pasteurizing it immediately thereafter is a procedure which does not impair flavor. An essential point is that the treatment must inactivate lipase, and this must be done immediately after homogenizing unless the milk is pasteurized first. If an entire vat of milk is to be homogenized, pasteurization may follow homogenization, but it must come first if part of the milk is to be bottled unhomogenized.

Digest from "Influence of Time and Temperature of Homogenization on Certain Properties of Milk," by G. M. Trout and M. V. Scheid. *Quarterly Bulletin*, Michigan Agricultural Experiment Station, Vol. 24, 122, 1941.

DEHYDRATION

Dried Egg Albumen

MOST of the dried egg albumen now produced in the United States is made by a fermentation process. The result of spontaneous fermentation is to form acid from the dextrose. The fermentation is stopped at the proper point, for example by adding lactic or tartaric acid. Fermentation is necessary for dried egg albumen if it is to be stored dry in unrefrigerated warehouses since without this step in the preparation both color and solubility stability would be lost or seriously impaired. This denaturation can be prevented without fermentation if the albumen is stored at temperatures of 3 to 5 deg. C. Flake albumen made from unfermented egg whites is much more sensitive to denaturation than is the powdered product.

Digest from "Dried Egg Albumen. I. Solubility and Color Denaturation," by Geo. F. Stewart and Ralph W. Kline, *Proceedings of the Institute of Food Technologists*, 1941, p. 48.

Drying Plant Tissues

DRYING succulent leaves, stalks or roots under mild conditions (in air or in vacuum at 60 deg. C.) does not change their lignin content as determined by the 72 percent sulphuric acid method. This was confirmed by tests with turnips, green rye fodder and ensilage, rhubarb and beets. But when the same plant tissues are oven-dried at 105 deg. C. their apparent lignin content is greatly increased. Investigation revealed that the discrepancy is due to inclusion of other substances (probably proteins and carbohydrates) in the lignin fraction when the sample is treated with sulphuric acid.

There is some evidence that a lignoprotein complex is formed and that drying increases the resistance of this product to bacterial attack. It has also been observed that digestibility of protein is decreased under severe drying conditions, presumably because the lignoprotein complex is indigestible. The substances which combine with lignin in high temperature drying are mainly water-soluble. For this reason the apparent change in lignin content at 105 deg. C. can be prevented by leaching with cold water or dilute alcohol before drying.

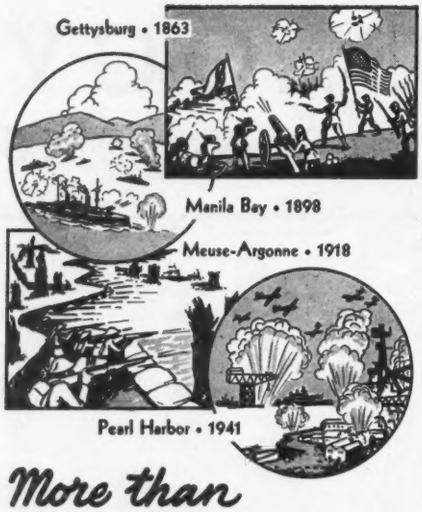
Digest from "Effect of Initial Drying Temperature on the Apparent Lignin Content of Plant Tissues," by D. MacDougall and W. A. DeLong, *Canadian Journal of Research*, Vol. 20B, 40, 1942 (Published in Canada).

PRESERVING

Pectin for Fruit Jellies

PARTIAL demethylation of pectin generally improves its efficacy as a jelling agent. The principal reason is that removing methyl groups increases the chemical combining activity of the pectin and not that purity is increased. Because fruit juices vary in their characteristics and in their responses to the varying conditions of jelly making, it is impossible to state any definite methoxyl content which enables pectin to exert its best effect. The optimum methoxyl content depends on the acid extraction method employed in preparing the pectin, and on the conditions to which the pectin is subjected.

It is possible to make 65 percent sugar jellies with pectins having as little as 3.5 percent methoxyl, and the low-methoxyl pectins can be utilized in making true, full-flavored canned jellies with low sugar content or even without sugar. A special advantage of jellies made with partially demethylated pectins (pectinic acids) is that heat processing does not deteriorate the product. These pectinic acids have a wide range of uses in salads (especially tomato aspic) and desserts. There is experimental evidence that they are useful in freezing sliced strawberries and cherries to reduce loss of juice on defrosting. Some frozen fruits,



More than
Four Wars Ago

In 1850, to be exact, a millwright named Geoge Frick built his first steam engine, and began the work which now means so much to the Victory Program.

Frick Steam Engine of the Fifties

By 1860 the Frick shops at Waynesboro were producing hundreds of engines. (General Lee's men, during the retreat from Gettysburg, took the belting from the plant, for use as shoe leather.)

Steam-driven Refrigerating Machine of 1883

Enclosed Compressor, Introduced in 1915

By the Spanish-American War, Frick refrigerating machines, introduced in 1882, were used in large numbers for packing meats, making ice, and storing essential foods.

By 1917 the importance of refrigeration was more fully appreciated. Thousands of Frick machines, in powder plants, hospitals, camps, ships, and supply bases, helped America win.

FRICK Refrigeration
Is now used in over 200 Industries

New War Dept. Bldg. in Washington has Frick Air Conditioning

In the present conflict our refrigerating ice-making and air conditioning systems play a still more vital part. Glenn Martin airplanes; Lycoming engines; Pratt and Whitney gauges; Hercules powder; the new War Dept. Building; scores of Army camps, Navy ships, arsenals, food factories, and civilian activities find Frick Equipment an invaluable aid.

Ships of All Classes Find Frick Refrigeration Indispensable

DEPENDABLE REFRIGERATION SINCE 1853
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

however, give better results in this respect with a high methoxyl pectin. An example is Elberta peaches. The pectinic acids may also be usful for detoxifying insecticidal and fungicidal sprays on fruits and vegetables, since the heavy metal pectinates are apparently nontoxic to humans. Experiments along this line should be productive.

Digest from "Demethylation of Pectin and its Effect Upon Jellying Properties," by Geo. L. Baker and Marvin W. Goodwin, *Bulletin 234*, Delaware Agricultural Experiment Station, 1941.

QUALITY CONTROL

Moist Bacterial Control

GROUND and fresh meat, thawed slow-frozen meat and washed fresh meat trimmings provide ample moisture, in released tissue water, for bacterial growth. This is one reason for the importance of prompt and rapid initial cooling in preserving beef, lamb, veal and pork. Rapid chilling in the first few hours is worth many hours of freezing at the end of refrigeration. Excess moisture, accumulating on fresh meat by "sweating" or from wash water or from water-drip lubrication of metal chutes, provides a film of favorable medium for bacterial growth. Prompt chilling is essential for such meats. Quick freezing is better for meats than slow freezing since it permits some water to escape unfrozen in the meat, and the water which freezes forms much smaller crystals. Hence the coarse ice crystals which rupture muscle fibers and make the thawed meat drip are absent in quick-frozen meat.

Digest from "Control of Bacteria in Moist Products," by L. B. Jensen, *Proceedings of the Institute of Food Technologists*, 1941, p. 148.

Detecting Spoilage In Fish

BY STATISTICAL correlation of pH hydrogen-ion concentration) levels in fresh and canned fish with spoilage characteristics, the freshness of the sample can be objectively estimated. Odor ratings, although subjective, can be correlated with pH data. In this way canned chum salmon, for example, can be rated to any desired degree of accuracy by taking a corresponding number of samples.

The pH test can be made very quickly, yet with a high degree of precision. It is more generally applicable than other spoilage tests because it apparently depends on a general decomposition or degradation of the fish proteins. It resembles other tests in having a rather large variability factor which necessitates statistical establishment of the relation between pH and an accepted standard of freshness, with data on standard deviations of pH in samples of equal freshness. Three different criteria can be utilized in establishing the pH. One is chemical determination of the buffer capacity of the tissue. Another is comparison with progressive bacterial counts as spoilage sets in and continues. The third is organoleptic testing by expert judges, chiefly by odor. This last test, though subjective, is helpful in connection with the more fundamental criteria.

Digest from "On the Use of the pH Value as a Measure of the Freshness of Fish Muscle Tissue," by F. Charnley and D. H. Goard, *Canadian Journal of Research*, Vol. 20D, 20, 1942 (Published in Canada).

Dry Bacterial Control

FOR consideration of bacterial control methods dry food products and their intermediate production stages may be classed in three groups: (1) Dry products from dry processes; (2) wet products from wet processes; (3) dry products from wet processes. In the first group, spices are potential sources of bacterial contamination and need sterilization before use. Gums such as agar are difficult to sterilize because of their heat sensitivity but can be successfully sterilized with ethylene oxide.

In the second group, refined sugar needs bacterial control more because of its effects on other foods than because of any tendency to spoil when kept by itself. Milk powder is another important product in this group; it may be contaminated by the raw milk, by unguarded water supplies or by inadequate sanitation in processing. In the third group, prepared cereals are most commonly contaminated by spore-forming thermophiles which may merely impair flavor or odor or may cause actual spoilage. Periodic cleaning of equipment to which the product is exposed before reaching the drier will prevent accumulation of thermophilic bacteria.

Digest from "Control of Bacteria in Dry Food Products," by Paul S. Prickett, *Proceedings of the Institute of Food Technologists*, 1941, p. 160.

VITAMINS

Vitamin C from Plants

THE WARING BLENDOR can be effectively used to avoid laborious grinding of plant tissues in extracting vitamin C (ascorbic acid) from parsley, cabbage, frozen peas, chard, mustard greens, potato, grapefruit peel and

other tissues. The Blendor and reagents are kept in a cold room (about 41 deg. F.). The cutting knives are covered with about 150 milliliters of extractant, a sample weighing 10 to 20 grams is added along with sufficient "Super-Cel" filter-aid for quick filtration, and the Blendor is operated at high speed for 5 minutes. In the case of grapefruit, a smaller sample (5 grams) is used. Some tissues foam in the Blendor, but a few drops of alcohol will make the froth subside quickly. The extractant is usually a mixture of 3 percent trichloroacetic acid and 2 percent metaphosphoric acid, but for grapefruit peel and fresh peas 2 percent metaphosphoric acid solution is used. After extraction the mixture is brought up to the desired volume by dilution with 8 percent acetic acid solution.

Digest from "Extraction of Ascorbic Acid From Plant Tissues," by Ward B. Davis, *Industrial and Engineering Chemistry*, Vol. 34, 217, 1942.

SUGAR

Recovery of Sucrose From Impure Solutions

A COMMERCIAL METHOD has been presented for the recovery of more sucrose from various forms of sucrose and glucose solutions. These, in some instances, are now run to waste or return to other points in the process.

In the operation of plantation raw sugar manufacture, the juice is first heated and sent to dessicating tanks, then treated with lime solutions and heated to a sterilizing temperature. This mixture is then run to settling tanks and heated until a sediment of mineral, organic and other impurities settle out. This is ordinarily thrown away. This sediment contains calcium salts and nitrogenous matter, which are valuable as fermenting aids and as foods for yeast. Ordinarily, it has been believed that only clear water should be used to dilute the impure sucrose solution, such as molasses and the like, in an attempt to get a commercial sucrose recovery from such impure solutions. However, instead of discarding the sediment, if it is added to the impure sucrose solution a greater amount of sucrose will be recovered due to the acceleration of the fermentation that takes place. The sediment has also previously been heated and sterilized and is at a proper temperature and degree of sterility for mixing with the molasses.

Digest from U. S. Patent 2,268,902, granted to John B. Ryan, Campbell, Calif., on Jan. 6, 1942.

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FORMULAS FOR FOODS

FORMULA NO. 316

Army Ration C (M-Unit)

Meat and Vegetable Stew
(Type III)

Beef	50 lb.
Potatoes	15 lb.
Or dehydrated potato cubes	3 lb.
Carrots	15 lb.
Dry beans	8 lb.
Tomato juice or pulp	12 lb.
Salt	14.5 oz.
Pepper, black	0.5 oz.
Celery salt	5 oz.

Directions

The beef component shall be based on the weight of the raw beef before braising. If fresh (unfrozen) beef is used, it is to be ground in a meat grinder fitted with a plate having holes approximately ¾ in. in diameter. If beef is frozen the holes will be approximately 1 in. in diameter. In lieu of grinding, the beef may be diced in cubes approximately ½ in. in diameter. Beef shall be braised until medium well done, with only enough added moisture to prevent scorching. All juices from the meat shall be included in the product. The kinds of meat to be used will be found in Formula No. 305.

The potato component shall be based on the weight of the peeled, trimmed and diced potatoes. These shall be cut into cubes of approximately ⅜ in. The dehydrated potato cubes, when used, shall be based on the weight of the dehydrated potato cubes. Dehydrated potato cubes shall be reconstituted in water before use.

The carrot component shall be based on the weight of the cleaned and diced carrots. These shall be diced into cubes of approximately ⅜ in.

The bean component shall be based on the dried beans before soaking.

Beans in the finished product shall be whole, separate and tender, shall not be mashed or pasty, but the skins may be split.

The braised beef, diced carrots and potatoes, soaked beans, tomato juice or pulp, and spices shall be thoroughly mixed. Water may be added, if necessary, to bring the moisture of the finished product within the prescribed range. After thorough mixing, the product shall be filled into tin cans, size 300x308. If solids and juices are separated for convenience in canning, they shall be placed in cans in proper proportion. The filled cans shall be exhausted, sealed and processed in accordance with best commercial practice. Moisture content of the finished product shall be not less than 72 percent and not more than 76 percent. Net contents of the cans shall not be less than 12 oz.

Formula from "Tentative Specification for M-Units, U. S. Army Field Ration C," Chicago Quartermaster Depot, No. 25B, January 15, 1942.

FORMULA NO. 317

Cinnamon Meringue

Egg whites	1 lb. 8 oz.
Sugar	2 lb. 10 oz.
Vanilla extract	½ oz.
Cinnamon	¼ oz.

Mixing Directions

Beat egg whites until firm. Add sugar and vanilla slowly. Add cinnamon and stir in until smooth.

Special instruction: Butter base cake should be baked in thin layers. After cooling, layers should be covered with lemon filling followed by topping of ¼ in. of cinnamon meringue. Meringue should be topped with broken pecan meats and browned in oven at 400 deg. F. Should be packaged and handled similar to pies and soft cakes.

Formula from Institute of American Poultry Industry.

FORMULA NO. 318

Homemade Pie Dough For Fruit Pies

Flour (ordinary pastry flour)	10 lb.
Shortening	7 lb.
Ice water	2 lb. 12 oz.
Salt	6 oz.
Corn sugar	5 oz.

Mixing Directions

Rub the shortening and flour together until the flour is partly coated with fat. Do not mix to a paste but, on the other hand, do not leave the shortening lumps too large.

Dissolve the salt and corn sugar in the water, add to the flour and shortening mixture until the mass is of uniform consistency.

Washing of pies made with this dough is not necessary. If correctly mixed, crusts will color uniformly on both top and bottom. If the flour is too soft, the crust will not remain crisp. If bread flour is used, the crust will likely shrink. Therefore, a medium-quality pastry flour is recommended for this formula.

Pointers for preparation:

1. The best results are obtained by using cold ingredients.
2. Store the flour to be used for pies in a cool place.
3. Water should be below 45 deg. F.
4. Shortening should be kept in a cool place.
5. Hot flour or shortening will ruin the crust.

Note: The shortening used in pie dough should be a product having a mild lard flavor; a better body than is normally obtained in lard; and a wide plastic range.

Formula from Swift & Co.

FORMULA NO. 319

Caramel Custard Pie

Whole milk	8 lb.
Brown sugar	3 lb.
Salt	¼ oz.
Vanilla	1½ oz.
Frozen eggs	2 lb. 12 oz.
Maple flavor	⅛ oz.
Caramel color	½ oz.

Mixing Directions

Heat the milk to 140 deg. F. Add the sugar, salt, flavors and color.

Stir until the sugar is melted. Add the eggs and stir. Do not whip.

Strain through a small sieve to remove any insoluble matter. Skim off the foam from the surface.

Pour into unbaked shells. Bake at 450 deg. F.

Formula from Swift & Co.

FORMULA NO. 320

Vienna Bread

Bread flour	100 lb.
Water (variable)	56 to 60 lb.
Salt	2 lb.
Malt Extract	1 lb.
Yeast	2 lb.
Shortening	1 to 2 lb.

Directions

Dissolve the yeast in part of the water. Dissolve the other ingredients, except shortening, in the mixer with the balance of water. Add the flour and follow with the yeast solution. When partially mixed, add the shortening and

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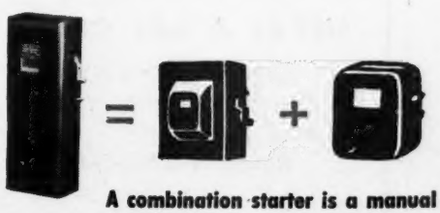

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FORMULAS FOR FOODS

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Army Ration C (M-Unit)

Meat and Vegetable Stew
(Type III)

Beef	50 lb.
Potatoes	15 lb.
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Dry beans	8 lb.
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Salt	14.5 oz.
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The braised beef, diced carrots and potatoes, soaked beans, tomato juice or pulp, and spices shall be thoroughly mixed. Water may be added, if necessary, to bring the moisture of the finished product within the prescribed range. After thorough mixing, the product shall be filled into tin cans, size 300x308. If solids and juices are separated for convenience in canning, they shall be placed in cans in proper proportion. The filled cans shall be exhausted, sealed and processed in accordance with best commercial practice. Moisture content of the finished product shall be not less than 72 percent and not more than 76 percent. Net contents of the cans shall not be less than 12 oz.

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Vanilla extract	½ oz.
Cinnamon	¼ oz.

Mixing Directions

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Special instruction: Butter base cake should be baked in thin layers. After cooling, layers should be covered with lemon filling followed by topping of ¼ in. of cinnamon meringue. Meringue should be topped with broken pecan meats and browned in oven at 400 deg. F. Should be packaged and handled similar to pies and soft cakes.

Formula from Institute of American Poultry Industry.

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Shortening	7 lb.
Ice water	2 lb. 12 oz.
Salt	6 oz.
Corn sugar	5 oz.

Mixing Directions

Rub the shortening and flour together until the flour is partly coated with fat. Do not mix to a paste but, on the other hand, do not leave the shortening lumps too large.

Dissolve the salt and corn sugar in the water, add to the flour and shortening mixture until the mass is of uniform consistency.

Washing of pies made with this dough is not necessary. If correctly mixed, crusts will color uniformly on both top and bottom. If the flour is too soft, the crust will not remain crisp. If bread flour is used, the crust will likely shrink. Therefore, a medium-quality pastry flour is recommended for this formula.

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Formula from Swift & Co.

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Salt	½ oz.
Vanilla	1½ oz.
Frozen eggs	2 lb. 12 oz.
Maple flavor	⅛ oz.
Caramel color	½ oz.

Mixing Directions

Heat the milk to 140 deg. F. Add the sugar, salt, flavors and color.

Stir until the sugar is melted. Add the eggs and stir. Do not whip.

Strain through a small sieve to remove any insoluble matter. Skim off the foam from the surface.

Pour into unbaked shells. Bake at 450 deg. F.

Formula from Swift & Co.

FORMULA NO. 320

Vienna Bread

Bread flour	100 lb.
Water (variable)	56 to 60 lb.
Salt	2 lb.
Malt Extract	1 lb.
Yeast	2 lb.
Shortening	1 to 2 lb.

Directions

Dissolve the yeast in part of the water. Dissolve the other ingredients, except shortening, in the mixer with the balance of water. Add the flour and follow with the yeast solution. When partially mixed, add the shortening and

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mix to a smooth, well-developed dough. The temperature of the dough should be 80 to 82 deg. F. Approximate time for first rising, 2 hours 30 minutes; the second rising, 45 minutes; take in, 30 minutes.

Make up Vienna shape and place in cloth, dusted boxes or on dusted peels. Give three cuts diagonally across top of each loaf before putting in oven. Low pressure steam should be used freely in the oven.

Formula from General Mills, Inc.

FORMULA NO. 321

Prepared Brown Bread Meal

Salt	14 oz.
Corn meal, white or yellow	45 lb.
Milk powder	7 lb. 8 oz.
Soda	2 lb. 15½ oz.
Baking cream (phosphate)	15 oz.
Bread flour	15 lb.
Rye flour	11 lb. 4 oz.
Whole wheat flour	22 lb. 8 oz.

Formula from Parker-Broeg.

FORMULA NO. 322

Plum Brown Bread

Bread crumbs	1 lb.
Cold water (variable)	3 qt.
Best grade molasses	1 qt.
Raisins	2 lb.
Prepared brown bread meal (Formula No. 321)	6 lb. 8 oz.

Mixing Directions

Place ingredients in machine or hand bowl. Mix thoroughly to get good development. This will assist in producing a head on the top of the Brown Bread. Weigh 1 lb. 7 oz. into one-quart Brown Bread molds, well buttered. Be careful not to slop mixture on sides of molds in filling, as this will hold edges down. Place in steamer that contains sufficient quantity of water to produce plenty of moist steam.

Steaming time, two hours (after steaming starts). Remove from molds immediately and turn right side up on papered sheet pans. When sufficiently cool, wrap in wax paper.

Formula from Parker-Broeg.

Cheese Spreads

Formulas for several cheese spreads, together with directions for making these products, are given in the article, "Directions for Making Cheese Spreads," starting on page 52 of this issue of FOOD INDUSTRIES.

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